40 Rock

POPULAR Computing WEEKLY

35p 5-11 May 1983 Vol 2 No 18

This Week

Win a Commodore 64
Write your own adventure game and you could win a Commodore 64, or a Vic20 For details of how to enter this new competition see, the form on page 35

Dragon software
Brian Cadge looks at a range of games from Vulcan noughts and crosses to Death's Head Hole See page 14

Race Electronics
David Kelly travels to South Wales to visit Race Electronics See page 13

Dragon sound
Peter Chase unravels some of the mysteries of the Dragon's machine code sound routines on page 25

STAR GAME
Space Panic on Spectrum. See page 10

News Desk



Commodore – new price deal

COMMODORE has reacted to the £50 drop in price of the 48K Sinclair Spectrum by revising its own home computer prices

From June 1, Commodore will sell the Vic20 as part of a combination deal that will include the C2N dedicated cassette player and probably a Rom cartridge — all for a price which a spokesman suggested would be "certainly no more" than the present cost of the Vic machine £139

The deal is expected to be similar to that now being offered in the US where, since the beginning of April, the Vic20, cassette player and cartridge combination has been selling for £130

Some US dealers have chosen to split up the package — selling the Vic20 for only £66 If the same happened here, the computer could sell for as little as £70

Commodore's British deal is

Continued on page 5

DK'Tronics in £150,000 record deal

DK'TRONICS has concluded a £150 000 software deal with K-Tel

Under the terms of the agreement which was announced at the Midland Computer Fair last week DK Tronics will supply K-Tel with 15 games including *3D Tanx* and *Dictator* Record distributor and wholesaler K Tel will distribute the programs to record shops and retail outlets

This deal, which is the first K Tel has signed with a software company—is believed to be the largest single order for UK home micro software

K Tel, who plan to start a promotional campaign from June 1, hope to see five new games from DK Tronics each month

DK'Tronics which is owned by David Heelas, employs 30 people and has been in existence for just two years Turnover in the first year was £250,000, but turnover in the second year is estimated to have reached £3m

Continued on page 36

★★ADVENTURE COMPETITION—WIN A 64★★



5-11 May 1983 Vol 2 No 18



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How to submit articles
Articles which are submitted for publication should not be more than 3 000 words long The articles and any accompanying programs, should be original It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted

All submissions should be typed and a double space should be left between each line Please leave wide margins

Programs should whenever possible be computer printed

We cannot guarantee to return every submitted article or program so please keep a copy If you want to have your program returned you must include a stamped addressed envelope

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work

This Week

Editorial

One surprising facet of the microcomputer industry is the number of people who are interested in both micros and science fiction/fantasy

Such luminaries as Mike Johnston, organiser of the ZX Microfairs, Jeff Minter of Llamasoft and Nick Lambert of Quicksilva, have admitted to being science fiction aficionados Scott Adams (he of *Adventureland* fame) has a library of more than 3000 SF titles Dave Langford, a regular contributor to *Computer and Video Games* has written a number of SF short stories and novels

Many micro games also have a strong SF/fantasy element *Space Invaders*, Artic's *Ship of Doom*, Melbourne House's *The Hobbit* and Carnel's *Black Crystal* are just a few of the current titles available

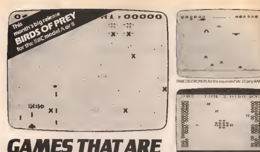
Films such as *Tron*, *Star Wars* and *ET* have spawned a host of arcade games which are starting to filter through to the more popular micros SF novels such as *Fantastic Voyage* *Starship Troopers* and *Dune* are also providing a breeding ground for the imaginations of many micro programmers

It is not a coincidence that Bug-Byte refers to its software as "A door to another dimension"

No one is quite sure how strong the correlation is between SF fan and micro user, but there is no doubt that a correlation exists

Next Thursday

Ian Logan reveals some of the mysteries hidden in the Spectrum's Draw command while A Edwards explains how to move a cursor over the Dragon's hi-res graphics screen, without destroying the picture underneath



GAMES THAT ARE HARD TO BEAT

Why? Because every single Romik game is professionally written in machine code to give you all the thrills and action of a fact-moving arcade game. Every one recorded on top quality tape, most of them playable either from the keyboard or with joysticks.

A lot of thought and development goes into every game – and we guarantee no bugs to drive you mad, no infuriating gaps to interrupt your fun.

Whether pitted against invaders from alien worlds, tracking hungry sharks or frantically stalling the melt-down of a nuclear reactor you can be sure that if it's a Romik game you'll have a battle on your hands. The kind of battle that leaves no room for mistakes or hesitation.

COMING SOON

Romik promise at least one new game every month, and soon there'll be Romik games for the Atari, Spectrum and Lynx computers.

FREE COMPETITIONS

Every action game purchased brings a free entry into the national competition to find the Supreme Champion, and free entry into the annual Romik Grand Master competition with its fantastic prizes.

TOP PRICES PAID!

We're always on the lookout for new top quality machine code arcade games for any machine. If you have what you consider a marketable game, let us know. Nobody pays higher royalties than we do.

GAMES AVAILABLE NOW

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Martian Raider
Sea Invasion
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Shark Attack
Atom Smasher
Space Attack
Mind Twisters
Multisound Synthesiser

Expanded VIC 20 (3K, 8K or 16K)

Time Destroyers
Moons of Jupiter

BBC (Model A or B)

Birds of Prey

Dragon

Strategic Command

ZX81

Super Nine – 9 1K games on one tape

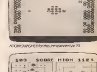
For further details of all our games and a list of stockists complate the coupon and send it to Romik Software, 272 Argyll Avenue, Slough SL1 4HE

ALL GAMES COST £9.99

ROMIK SOFTWARE

ROMIK

TIME DESTROYERS for the expanded Vic 20 (any RAM)



ATOM SMASHER for the unexpanded Vic 20

POWER BLASTER for the unexpanded Vic 20

SPACE FORTRESS for the unexpanded Vic 20

Please send me further details of your games and a list of stockists

Name ____________

Address ____________

POW3/5

______ Age (if under 21) ______

I own a ______ computer

Price deal

Continued from page 1

to be accompanied by what it claims is the company's biggest-ever promotion with a budget exceeding £½m

Following last week's announcement of Sinclair computer price reductions, Sinclair itself has now cut prices to the same level (see *Popular Computing Weekly* April 28) The price of the ZX Printer also drops from £59.95 to £39.95

● Acorn's Chris Curry sees these price moves as a reaction to the impending launch of his new £150 computer, the Electron

We quite expected the Sinclair prices to drop prior to the Electron's launch," he said The Spectrum cannot compete with the Electron's superior performance in the same price bracket

The first appearance of the Electron is now expected very shortly — although it may not go on sale in the shops until the summer

National ZX Users Group closes

THE National ZX User's Club — founded by Tim Hartnell three years ago — has closed

Its monthly magazine, *Interface*, is to cease publication and its last issue has now been sent to members

Liz North UK co-ordinator for the club said We feel we have done our job now When Tim started *Interface* there were no local user groups or specialist ZX magazines But there comes a point when one must grow up — when other people are doing the job we have been doing "

Both of the specialist ZX magazines — *ZX Computing* and *Sinclair User* — were begun with help from Tim and the National ZX Users Group

Those with memberships still to run are being offered either a full refund for the outstanding period, or discounted purchases from the range of books published by Interface Publications

Interface Publications will continue to produce computer books and software and Tim Hartnell will continue to write and edit new titles

At its peak the group had over 10 000 members

Cyborg disc drive for home micros

A NEW low cost 5¼-inch single disc system is being developed by a French company called Cyborg

The system is designed to be compatible with over 25 microcomputers — including the ZX81, Spectrum Oric and BBC machines Connection to the different machines requires only a change of lead

The system is capable of this because it incorporates its own 6500/12 processor as part of the disc operating system board Consequently, the operating system software does not need to be compatible with the host machine

In the case of the ZX81 implementation, for example, the Exponential key is used as an entry to the software, instructing the disc system to down load the necessary interfacing software — only 1K is used and this is afterwards returned to the user — giving access to the disc system's operating directory

The Cyborg system uses a conventional 5¼-inch single-sided single density disc drive with a formatted disc capacity of over 360K

The system also incorporates a unique software protection system with the *Secure* keyboard instruction making discs difficult to copy

Cyborg's single disc drive is planned for the summer at a price of around £225, including VAT

The company can be contacted at 22 Boulevard Saint Michel, 75006 Paris, France (Tel 01 033 1 329 62 37)

Micro income tax guide

AN answer to all those taxing problems is provided by a new company called Microtax It is offering a microcomputer program for completing tax returns which will run on most home micros

The software package — available for the 48K Spectrum, 16K Vic20, Dragon 32 BBC Model B, Commodore 64 and 400 Series Pet — provides a step by step guide The program leads the user through the 1982/3 tax return explaining exactly what to fill in advising on the most advantageous tax options and calculating the total tax liability for the year

A version of the program for the 1983/4 tax year is planned for autumn 1983

Microtax is available for £24 95 from Microtax, Barratt House 7 Chertsey Road Woking Surrey

Swiftlink

SWIFTLINK Software — the London-based BBC software house — has ceased trading

According to the company's founder, Neil Munns, the decision to fold the company has been taken for "personal and financial reasons"

Zeaker micro turns turtle

THE Zeaker Micro-Turtle is a two-wheeled mobile robot produced by Colne Robotics

The Zeaker is controlled from a computer and comes with software which allows its movements to be memorised and reproduced

A built-in retractable pen can be used to create Logo-type graphics The unit costs £60 in kit form and £80 built (including VAT) and is designed to connect to the ZX81 and ZX Spectrum computers, as well as to any machine with an 8-bit bi directional port

Details from Colne Robotics, Beaufort Road off Richmond Road Twickenham Middx

All change at Quicksilva

CHANGES are taking place in the Quicksilva stable

Founders Nick Lambert and John Hollis are stepping down from the day to-day running of the company — Rod Cousins has been appointed general manager

"Quicksilva has now got to the stage where it is operating smoothly — developing releasing and marketing new games," explained Nick Lambert

Nick Lambert (left) and Rod Cousins

"John Hollis and I will now be less involved with the everyday running of the company leaving us time for other things "

Nick is understandably cagey about what plans he has but they involve the setting up of a new company "We are going to carry on doing what we are good at — which is coming up with new ideas

"The new company's activities are a development of Quicksilva's — and are software related " he said

"Our first new project is really John's — he is working on the technical half " added Nick mysteriously

"Obviously we will maintain our involvement with QS but as the new company gets going more and more of our time will be spent on the new project "

● Quicksilva became a limited company in March 1982 and a turn-over in excess of £10m is expected this year



Richard Shepherd Software
Rid the world of the Transylvanian Terror before he introduces you to the dark world of the living dead in...
Transylvanian Tower
A spectacular 3-D maze adventure for the 48K Spectrum only £6.50
"Enthralling and addictive"... Popular Computing Weekly
"Addictive"... Sinclair user

LETTERS

Oric's non-appearance

In *Popular Computing Weekly* March 31 your News Desk section states "existing mail order customers who have ordered the 16K machine (Oric) have been sent 48K models on extended loan and they will apparently be replaced when the 16K unit becomes available"

I ordered a 16K Oric computer at the end of last year as a present for my son. Apart from an option to purchase a 48K version at an additional cost of £70 I have not received any other communication to date even though I wrote to Oric regarding this matter on March 12. My bank reported that my cheque for the purchase price of £105.90 was cashed on February 23.

I would be interested to know how many of your readers have had a similar experience to mine, and obliged if you would convey the contents of this letter to Oric as direct written communication does not seem to produce any response from them.

E W Jefferson
3 Hinton Wood Avenue
Highcliffe on-Sea
Dorset BH23 5AB

The missing link

The Students 'T' program published in Vol 2 No 9 suffered from a gremlin and a terminological inexactitude. The gremlin caused the end of an equation to disappear in printing, despite the listing being correct on submission. To make it work add

```
(F(1)+1))−2
```

to the end of the published version of Line 950.

The other problem was less serious. It involved the routine used to estimate the probability that the calculated value of 't' could be exceeded by chance (*FNchances*). When the difference between the means was insignificant (when *t*<*1*) the routine as published exaggerated the insignificance. Either way you would have rejected any thoughts that you were dealing with a real difference but the '% confident" figure printed out was too small.

A better estimate of this figure will be obtained by following the alterations suggested below

```
Line 410 becomes IF T< 45 THEN 430
Line 530 becomes IF T< 45 THEN 550
Line 540 becomes X=(1−X)/2+f!
```

Remember this only affects the response to situations when 't' is less than 1, ie to situations when the difference between the means is insignificant.

Calvin Woodings
12 Copsewood Avenue
Nuneaton
Warwickshire CV11 4TQ

Our thanks go to Alan Mitchell of Ledbury, Herefordshire, for spotting the error and writing to request an improvement, and our apologies for missing off the end of line 950

Positive action

I have been following the correspondence in your magazine regarding software copyright and piracy and in particular, software libraries. I would like to make the point that while I agree that large scale software copying will in the longterm be detrimental to the industry as a whole, surely the onus is on the manufacturers of commercial software to protect their programs from copying — a good example is Rabbit Software's *Nightcrawler* program for the Vic20.

Instead of moaning about how hard done by they are, these companies should be doing something positive to help themselves.

Andrew Buck
8 Carey Park
Helston
Cornwall

A delicate matter

I very rarely feel the need to express my views in print but as I read *Popular Computing Weekly* with interest I have been able to follow the Software Centre's Buy'n Try scheme dispute with Quicksilva. From what I can gather from the articles Quicksilva is worried about the copying of its tapes before they are returned.

I am pleased to see both parties have reached an agreement out of court. But reducing the buy-back period from six months to one month is surely encouraging the copying of tapes.

After all one month barely gives you time to achieve a high score! But after six months you are most likely to be fed up with the game and not want to record it before returning it.

I would be interested in other people's views on this delicate matter of copyright.

James McKellar
Chemes House
Top Street
North Wheatley
Retford
Nottinghamshire

Memory saver . . .

I would like to comment on C Whitehead's letter (April 14) which corrects the '*Board Game*'. It wastes a lot of the memory that the letter tries to make us save.

Assuming that the Dragon 32 uses five bytes to store a number (I don't know, not owning a Dragon), and as an array of 75 numbers is dimensioned, 59 of which are not used, 295 bytes are wasted!

If you look carefully at the numbers in lines 570-630 and 640-740 you will see that *C* and *D* respectively are increased by 20 each time, ie, 25, 45, 65, 85.

Now a little thought can replace 20 lines and 9 in C Whitehead's letter with 4 lines

```
550 A$ = INKEY$
560 IF A$ = "X" THEN 10
570 IF ASC(A$) > 48 AND ASC(A$) <
    60 THEN C = (ASC(A$) - 49) *
    20 + 25 F1 = 1
580 IF ASC(A$) > 64 AND ASC(A$)
    < 70 THEN D = (ASC(A$) - 65)
    * 20 + 25 F2 = 1
```

This approach removes 75 numbers of five bytes each, 375 bytes in all. In fact, because of all these bytes C Whitehead's alteration probably uses more memory than the original.

Stephen Roberts
100 St James Street
Shaftesbury
Dorset SP7 8HQ

Dragon hater!

It is amazing discovery time for Sinclair ZX Spectrum owners! Before you groan, I can promise that it is not another bug. It's all to do with the Spectrum's ability to change the colour of its border. The program below produces a flicker-free, striped border. Please notice there are no traces of machine-code.

```
  1 PAPER 7 INK 0 BORDER 7
    CLS
  2 PRINT AT 1 5 CHR$ 127 1983
    Andrew Wiseman"
  6 PLOT 0 8 DRAW 239 0 DRAW
    0 158 DRAW —239 0 DRAW
    0 —158
 10 BORDER 7
 20 BORDER 1
 30 BORDER 2
 40 BORDER 3
 50 BORDER 4
 60 BORDER 5
 70 BORDER 6
 80 BORDER 7
 90 BORDER 0
110 PAUSE 1
120 GO TO 10
```

When Run the border will have a black streak at the top and bottom of the screen with a white streak separating the colours down the sides of the screen from the black. The stripes are flicker-free (until you press a key) because of line 90. Using the method above, you can have from one to eight stripes on screen at one time, any more than this produces a shaky effect.

Am I the sole person in the world who loathes the Dragon 32? It costs so much and does so little! Why don't we blow up all the Dragons and re-issue owners with Atari 400s? This will result in no more Dragon manual bugs and no more letters about the speeding up of its chip!

Andrew Wiseman
68 Mayfield Road
Hartford Huntingdon
Cambridgeshire PE18 7NJ

More 1k's please

I am writing to you to complain. I think you should have more 1K ZX81 programs. I say this because there is nearly nothing in your magazine for this popular computer. Lots of people have ZX81s but lots of them do not have the extra 16K Ram.

I am sorry to have to say this about your popular magazine but maybe you should devote less space to the BBC model B micro and more to 1K computers. Thank you for your time — I hope you understand that a lot of users cannot buy or other add-ons for their system because of the cost.

Frederick E Thornton
65 Langton Way
Blackheath SE3 7JU


STARTECH
Absolutely the lowest prices!
16K
VIC 20
16K RAM PACK
£28.95
Including VAT and Postage and Packing.

THE MEN WHO INVENTED ME WERE CLEVER ENOUGH TO MAKE ME THINK IN 'FORTH' (IT'S 10 TIMES FASTER AND 4 TIMES MORE COMPACT THAN 'BASIC')

YET THEY'RE DUMB ENOUGH TO SELL ME FOR £89.95!

Richard Altwasser and Steven Vickers are the men who invented the Jupiter Ace

After years of designing micro-computers that use BASIC (both men played a major role in creating the ZX Spectrum) they abandoned it in favour of FORTH

FORTH is just as easy to learn as BASIC Yet it s a faster more compact and more structured language that educationalists and professional programmers alike prefer

So the Jupiter Ace is the only micro computer you can buy that is designed around FORTH

Using it there s little fear of accidentally 'crashing' programs halfway through and having to start all over again (a common fault with BASIC) The Jupiter Ace s comprehensive error checking sees to that.

The Jupiter Ace has a full-size keyboard high resolution graphics sound floating point arithmetic a fast reliable cassette interface 3K of RAM and a full 12 month warranty.

You get all that for £89 95 Plus a mains adaptor all the leads needed to connect most cassette recorders and TV s a software catalogue (35 cassettes available soon to be 50) the Jupiter Ace manual and a free demonstration cassette of 5 programs

The Jupiter Ace manual is a complete introduction to personal computing and a simple-to follow course in FORTH from first principles to confident programming

Plug on 16K and 48K memory expansions are also available at very competitive prices (There ll be a plug-on printer interface available soon too)

It ll take you no time at all to realise how clever Richard and Steven were to design the Jupiter Ace around FORTH And even less time to realise what a silly price £89 95 is to charge for it

Technical Information

Hardware
Z80A 8K ROM 3K RAM

Keyboard
40 moving keys auto repeat, Caps Lock

Screen
Memory mapped 32 col x 24 line flicker free display upper and lower case ascii characters

Graphics
High resolution 256 x 192 pixel user defined characters

Sound
Internal loudspeaker may be programmed for entire audio spectrum

Cassette
Programs and data in compact dictionary format may be saved verified loaded and merged All tape files are named Running at 1500 baud

Expansion Port
Contains D C power rails and full Z80 Address data and control signals Can connect extra memory peripherals

Editor
Allows complete editing and listing of compiled programs

Please send cheque/postal order to Jupiter Cantab Ltd North Wing Freemasons Hall Bateman Street Cambridge CB2 1LZ

Jupiter ACE

Please send me Jupiter Ace microcomputers @ £89 95 (+ £3 95 p & p)
Tick here if you require VAT exempt ☐

Name 00103.83

Address

Available for immediate delivery Allow 14 days for p & p U K price only (export price on request)



Space panic

A new game for the 16K Spectrum by C Williams

This program, Space Panic is written for a 16K ZX Spectrum It is a version of the arcade game of the same name

The object of the game is to dig holes and bury the four monsters who prowl the metal girders To dig a hole simply press *Caps Shift* with *a* to dig to the left, or with *d* to dig to the right

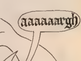
When a monster falls down a hole, you are awarded 100 points and the hole is filled with the dead body of the monster When all the monsters are buried a fanfare is played and a bonus is given — the amount of points depending on the time taken to clear the wall and the level of play

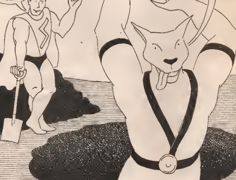
Also, you only have a limited amount of oxygen which you use up more quickly as the level of play increases If it runs out, you suffocate and fall to the ground A warning beep tells you when your oxygen tanks are nearly empty

If you are caught by a monster, it pushes you off the girders and you fall to your death At the fourth wall you are awarded an extra life To make the program go faster, delete the *Beep* in line 521 and shorten the *For/Next* loops in lines 1020 to 1060 and 1500 to 1540

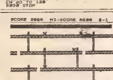
The user defined graphics are

-A.
-B
-C
-D
-E
-F
-G
-H
-I





```
10 LET hs=0  RESTORE
20 FOR z=144 TO 152  FOR x=0 T
O 7  READ a  POKE USR CHR$ z+x,a
  NEXT x  NEXT z
30 DATA 0,97,127,97,97,0,64,
96
40 DATA 12,28,40,112,73,70,66,
104
50 DATA 24,24,126,90,24,36,36,
4,12
60 DATA 70,140,252,140,140,0,
60 DATA 24,24,12,14,146,99,34,
22
80 DATA 255,200,129,65,30,24,2
55,255
90 DATA 30,36,60,30,36,60,30,3
100 DATA 0,195,198,260,195,20,2
4,1
110 DATA 0,0,0,60,30,24,256,265
120 BORDER 0  PAPER 0  INK 7  C
LS
130 PRINT TAB 10,"SPACE PANIC"
140 PRINT '''                Control
s
150 PRINT '"        a-left      d-
right"
160 PRINT '"        w-up        x-
down"
170 PRINT '" CAPS SHIFT with "a
" or "d" to       dig in that di
rection
180 PRINT '' INK 5,"           X
" INK 7,"-100 pts"
190 PRINT '"    1000 bonus when
all four          ghosts buri
ed"
200 PRINT '"    Extra man at fou
rth wall"
210 PRINT '' FLASH 1,AT 21,4,"P
RESS ANY KEY TO PLAY"  PAUSE 0
220 CLS
221 LET sc=0  LET li=3
222 LET l=.1
230 PRINT AT 5,0, INK 6,[redacted]",AT 1
0,0,"[redacted]",AT 15,0,"[redacted]",AT 20,0,"[redacted]"
240 PRINT INK 6,"[redacted]"
300 DIM s$(4)
310 FOR z=1 TO 4. LET s$(z)="X"
  NEXT z
320 FOR z=4 TO 9  PRINT INK 4;A
T z,5,"H",AT z,25,"H"  NEXT z
330 FOR z=16 TO 19  PRINT INK 4
AT z,5,"H",AT z,25,"H"  NEXT z
340 FOR z=9 TO 14  PRINT INK 4,
AT z,10,"H",AT z,20,"H"  NEXT z
350 PRINT INK 2,AT 2,0,"[redacted]"
370 PRINT AT 0,0,"SCORE ",sc,TA
B 10,"HI-SCORE ",hs,TAB 27,"^-",
li
380 PLOT 0,165  DRAW 255,0
390 LET a=10  LET b=1
400 LET d=10  LET c=10
410 PRINT OVER 1, INK 5,AT 4,c,
s$(1),AT 14,c,s$(3),AT 19,d,s$(4
),AT 9,d,s$(2)
420 PRINT OVER 1;AT a,b,"^"
430 BEEP .5,4
440 FOR o=31 TO 0 STEP -1
450 PRINT AT 2,o," "
460 IF o<8 THEN BEEP .08,8
470 PRINT OVER 1, INK 0,AT a,b,
"^"
480 LET a=a+(INKEY$="x")-(INKEY
$="w")
490 BEEP .01,-a+10
500 LET b=b+(INKEY$="d")-(INKEY
$="a")
510 IF INKEY$="A" OR INKEY$="D"
 THEN GO SUB 1000
520 LET k$=SCREEN$ (a+1,b)
530 LET l$=SCREEN$ (a,b): LET g
=ATTR (a,b)
540 PRINT OVER 1, INK 0,AT a,b,
"^"
550 IF k$=" " THEN GO TO 2000
555 IF l$="" AND g=5 THEN GO TO
 2000
560 PRINT OVER 1, INK 4,AT 4,c,
s$(1),AT 14,c,s$(3),AT 19,d,s$(4
),AT 9,d,s$(2)
570 LET r=RND
580 LET c=c-(r>.5 AND (c>0))+(r
<.5 AND (c<31))
590 LET d=d-(r<.5 AND (d>0))+(r
>.5 AND (d<31))
600 PRINT OVER 1, INK 5,AT 4,c,
s$(1),AT 14,c,s$(3),AT 19,d,s$(4
),AT 9,d,s$(2)
610 IF ATTR (5,c)=7 AND (s$(1)=
"X") THEN PRINT AT 5,c, INK 6,"
X"  BEEP .1,30  LET sc=sc+100  PR
INT AT 0,6,sc  LET s$(1)=" "  PR
INT AT 4,c,"  "
620 IF ATTR (10,d)=7 AND (s$(2)
="X") THEN PRINT AT 10,d, INK 6,
"X"  BEEP .1,30  LET sc=sc+100
PRINT AT 0,6,sc  LET s$(2)=" "
PRINT AT 9,d," "
630 IF ATTR (15,c)=7 AND (s$(3)
="X") THEN PRINT AT 15,c, INK 6,
"X"  BEEP .1,30  LET sc=sc+100
PRINT AT 0,6,sc  LET s$(3)=" "
PRINT AT 14,c," "
640 IF ATTR (20,d)=7 AND (s$(4)
="X") THEN PRINT AT 20,d, INK 6,
"X"  BEEP .1,30  LET sc=sc+100
PRINT AT 0,6,sc  LET s$(4)=" "
PRINT AT 19,d," "
650 IF s$(1)=" " AND s$(2)=" "
AND s$(3)=" " AND s$(4)=" " THEN
 GO TO 5000
660 NEXT o
670 GO TO 2000
1000 LET s=+(INKEY$="A")-(INKEY$
="D")
1001 LET f$=SCREEN$ (a,b)
1002 LET f=ATTR (a,b)
1015 IF s=1 THEN GO TO 1500
1020 FOR z=144 TO 148  FOR x=1 T
O 15  NEXT x  PRINT AT a,b,CHR$
z  NEXT z
1030 FOR x=1 TO 10  NEXT x. PRIN
T AT a,b,"^"
1040 PRINT INK 0,AT a+1,b+1,"X"
1050 FOR z=144 TO 148  FOR x=1 T
O 15  NEXT x  PRINT AT a,b,CHR$
z  NEXT z
1060 FOR x=1 TO 15  NEXT x  PRIN
T AT a,b,"^"
1070 PRINT AT a+1,b+1," "
1071 PRINT OVER 1,AT a,b,"^"
1075 IF f$="" AND f=4 THEN PRINT
 AT a,b, INK 4,"H"
1080 RETURN
1500 FOR z=148 TO 148. FOR x=1 T
O 15  NEXT x  PRINT AT a,b,CHR$
z  NEXT z
1510 FOR x=1 TO 18: NEXT x  PRIN
T AT a,b,"^"
1520 PRINT INK 5,AT a+1,b-1,"X"
1530 FOR z=148 TO 148  FOR x=1 T
O 15  NEXT x  PRINT AT a,b,CHR$
z  NEXT z
1540 FOR x=1 TO 10  NEXT x: PRIN
T AT a,b,"^"
1550 PRINT AT a+1,b-1," "
1555 PRINT OVER 1,AT a,b,"^"
1560 GO TO 1075
2013 FOR z=a TO 19
2015 BEEP .05,-z  BEEP .08,-z-10
2020 PRINT INK 0,AT z-1,b," ",AT
 z,b,"^"
2021 NEXT z
2030 PRINT OVER 1,AT 20,b,"0"
2040 PRINT AT z-1,b," "
2050 FOR y=1 TO 50  NEXT y
2060 LET li=li-1  PRINT AT 0,29,
li  IF li=0 THEN GO TO 6000
2070 CLS
2080 GO TO 230
5000 FOR y=1 TO 8
5010 RESTORE 5020  FOR z=1 TO 8
 READ cc,dd  BEEP cc,dd  NEXT z
5020 DATA .1,0,.1,0,.1,0,.1,0,.1
,4,.1,3,.1,2,.1,1,.3,50
5030 NEXT y
5035 LET sc=sc+INT (1(100*a)+10
)  PRINT AT 0,0,sc
5040 LET l=l+.1  CLS  IF l>.4 T
HEN LET l=.5
5050 IF l=.4 THEN LET li=li+1  F
OR z=1 TO 10  BEEP .02,17  NEXT
z  IF l>.4 THEN LET l=.5
5060 GO TO 230
6000 PRINT AT 11,10, FLASH 1,"GA
ME OVER"  FOR z=20 TO -10 STEP -
2  BEEP .02,z  NEXT z
6010 IF sc>hs THEN LET hs=sc  PR
INT AT 0,21, FLASH 1,hs
6020 INPUT "ANOTHER GO ? ", L
INE a$  IF a$="y" OR a$="yes" TH
EN GO TO 120
6030 STOP
```



Racing ahead in Wales

***David Kelly** visits Race Electronics to see computers being manufactured*

Increasingly computer companies both here and in the US are beginning to look to the Far East to build their designs

Atari for example has recently decided to move most of its production to Taiwan In this country Acorn is keen to manufacture its new computer the Electron, in Singapore

One reason that home-grown computer companies are looking overseas to manufacture is that few British plants are equipped to compete with the automated production techniques of the Far East

One company determined to compete with foreign plants on an equal footing is Race Electronics in South Wales The company has installed the latest component insertion equipment and at present assembles printed circuit boards for both the Dragon and BBC computers

Race was formed in 1977 by its present managing director Keith Arnold Initially the company began by designing and manufacturing fruit-machines The fruit-machines industry was one of the first to use the microcomputer seriously — few people realise quite how sophisticated they now are They contain a computer which is substantially more powerful than the Dragon for example, and some of the machines now being developed by Race will even incorporate computer/video disc player combinations

In 1981 Keith Arnold visited Japan to learn about automated production technique I realised that that was the future for the company and that a significant expansion was needed " he said So Race was incorporated into the Ace Gaming Machines Group and the move enabled the company to spend £1½m investing in automated assembly equipment and expertise

Involved with Dragon

"After the introduction of that equipment we managed to win the contract for the BBC machine assembly in May last year, and shortly after that we negotiated the Dragon contract,' says Keith

Chris Lare, Race s technical design manager was involved in sorting out the Dragon s production 'We were involved in the Dragon at a very early stage at a time when there were only six or eight circuits around — the ones built up by the Pats Centre in Cambridge

We got the final pre production models late last June — and from then on we began to gear up for automatic assembly — essential for a product like the Dragon

The first machine Race installed was an Amistar chip inserter — costing around £20 000 — over two years ago The company now has two of these machines and has installed two more machines priced at over £100 000 each, to insert resistors and capacitors

All the machines work in roughly the same manner The printed-circuit board is clamped very accurately — to within several thousandths of an inch — into a specially designed jig The machine then aligns the jig underneath the component inserter, fed with chips from a tube or discrete components from a conveyor belt. The component is pushed through the board bent and the wires trimmed all in one action Then the jig is rotated to the position for the next component

The route that the insertion equipment takes across the board is determined by the program in the machine s central computer — and components are inserted in strict order, depending on their height and the size of the jaws needed to grip them

Checks each component

Of the 200 components on the Dragon board, 86 percent are auto-inserted The remainder — components unique to the board requiring special tooling to auto-insert or components which may not appear on future generations of the board — are inserted by hand

The boards are then flow-soldered They are put on to a conveyor belt which takes the boards through a river of molten solder

Finally the boards are tested on the Marconi Automatic Testing Equipment (ATE) installed at Race Each finished board is loaded into the machine and lowered on to a test template which makes electrical connections to over 300 places on the board The ATE's computer then systematically goes through the board checking each component in turn

Getting a job such as the Dragon board to run down the company s automated production line requires a considerable amount of setting up

"As soon as we get a new job we try to pass out as much advice as we can to make the design compatible with our assemble equipment explains Chris

"How to make it how to test it what sort of components to use — we produce a 10-page specification detailing our requirements Many of our problems stem from lack of foresight on the part of computer designers The BBC machine, for example, is not very well suited for automated production

"First we will build a small production run — maybe 50 machines This is where any snags in the design should begin to show up There is a very big difference between building five boards in a laboratory and building 50 on a line — things tend to change!

Then we gradually ease into full production — usually a ramp-up — 100 one week 120 the next and so on You have got to allow time for the technicians to train themselves — each job presents its own problems

'Before the automatic insertion and testing equipment can be used the machines have to be programmed — and this is quite time consuming The ATE tests every component on the board and it has to be programmed to do so The machine in fact uses a deviant form of Basic called Incite

Some of the instructions are familiar — *For/Next* loops for example — others not so for example, *Link* 'A4 (113, 244) tells the machine to make two connections to track A4 on the board at positions 113 and 244 (each connection to the board is given a number) Another example *Res* "R9 270 %6 (216 208) tells the ATE to test between points 216 and 208 which should have a resistance of 270 ohms with a tolerance of 6%

If any of the tests produce the wrong value, it s noted by the machine and at the end of the test a print-out is produced, rather like a diagnostic test on a car

Race Electronics is now manufacturing 4 500 Dragon machines a week and 750 BBC machines (Race is only one of three plants for the BBC) Since the beginning of this year, Race has manufactured 42,000 Dragon boards

Race employs 153 staff and the production lines work 24 hours a day The company is not showing much sign of suffering from overseas competition

"Race has shown that manufacturers are prepared to make considerable investment in high technology plant in this country — equipment which is as sophisticated as that used in the Far East

We also offer the advantage of proximity You have to be sure you can keep in touch with your manufacturing plant and — notwithstanding the import tax on chips — we can match prices from overseas with only a very small differential

"I am sure that the companies that we manufacture for considered the possibility of overseas production very seriously — but the still chose us ■

Chris Lare technical design manager

From bad to very good

***Brian Cadge** roams through another selection of arcade and adventure games for the Dragon*

Adventure games, at least for the Dragon computer, seem to be enjoying great popularity at the moment — even Dragon Data's own range of software includes six adventure titles. Four of the eight programs reviewed here from independent software houses are also adventure/role-playing type games — *Pirates Ahoy*, *Pharaoh's Curse*, *Death's Head Hole* and *Champions*. The others are *Invaders Revenge* and *Alien Blitz* which are arcade games, and the two I shall begin with — *Sultan's Maze* and *Vulcan Noughts and Crosses*.

Vulcan Noughts and Crosses from Salamander Software comes in their usual custom plastic box with full colour picture sleeve. Inside is a small instruction sheet with clear loading instructions and minimal playing guidelines. The game is a revamped version of three dimensional noughts and crosses played on four planes set out across the screen. More instructions are included in the program with the choice of zero to two players (zero players means the computer plays a demo game).

The program makes good use of low-res colour graphics, but the computer's pieces are not visible against the background on a black and white tv and there is no simple way to change the colours. This really is an unacceptable oversight on Salamander's part and one which I hope they will take note of as the game is useless to anybody not having access to a colour tv.

Each move requires three numbers (plane, *X* position, *Y* position). Younger players may find this confusing to remember and a joystick option would have been an advantage. During the computer's move there is a tediously long wait with the appearance of obviously random numbers on the screen. The standard of play is good and is set at the same level which, with practice, is not impossible to beat.

It is a good version of an old game which, if it were not for the problem with black and white tv's and the method of input, would be an excellent game.

Sultan's Maze from Gem cannot really be classed as an adventure game. It takes place in Hampton Court maze which is represented by stunning 3D-graphics showing the view of the hedges and passages to the front and side of you. Your job is to collect the jewels which are scattered about the maze, while avoiding the mad bodyguard who attacks anybody in sight!

All of the commands are single key and are very easy to remember. There are also options to view a summary of the commands at any time (this is very useful) and to see a plan view of the maze showing the positions of the player, bodyguard and jewels. Viewing the map takes up extra energy, as does jumping through hedges to take short cuts.

There are 10 levels of difficulty which control the hunting speed of the guard and the time for which the map is displayed. It is worth being caught just to watch the giant red man run towards you, as again the graphics are excellent at this point.

The game is written in Basic, so there is a delay of about three seconds between each picture, but this is quite acceptable. Also, the game is in 'real time' so even if you stand still the guard carries on hunting for you.

Sultan's Maze is well packaged, has excellent instructions and loaded every time (quite unusual in this review). It is reasonably priced at £7.95 and is a welcome addition to the range of Dragon software.

. . . a standard adventure game . . .

Moving on to the adventure games, you are told that to Load *Pirates Ahoy* you will need to *Pclear 1* first to obtain the extra memory required. No mention is made of the fact that if you have been using graphics previously, you must type *Pmode0 1* first or you will get *Fc Error*.

The game begins by giving you a clue to where the treasures are (there are seven). The locations do not change, but the positions of some of the treasures do. Almost every time I played, the program only let me go to five different locations which became rather frustrating. If you are lucky enough to find the boat, the adventure really starts here. There are some 83 different locations to explore (I have only managed to get to around 28!). Instructions are given in the usual way — *Go North*, *Open Hatch* etc although abbreviations may be used to save aching fingers.

The text presentation on the screen is well-planned with all relevant information shown. The descriptions are useful and numerous if a little terse — no graphics or sound is used.

I found it annoying that there was no option to *Save* the game so far completed. As one game can take literally hours to play, this would have been a good idea.

I will not give any more away, as this would spoil the game for anyone playing it. As adventure games go, this one is nothing outstanding, but that is not to say that it isn't enjoyable to play. The lack of graphics and sound is not a major drawback in games of this type.

If there is such a beast as a standard adventure game then *Pharaoh's Curse* must be an example. Although the cassette comes with good loading instructions taken from a computer print out, this game was the most difficult to load. After countless (and I mean countless) *I/O Errors* the program did finally load successfully.

This is the type of adventure where nothing ever changes — you always begin in the valley of tombs, the box always contains the snake and so on. There is no list of words that you can use, the only thing to do is try it and see! Typing *Help* gives a really giveaway clue as to what to do next. Sound and graphics are again neglected and the text is displayed in a messy format. One good point is the *Save* game option which is lacking in the other games.

Overall, after the trouble I had loading the game I had begun to lose interest anyway, and after 30 minutes of play I was bored stiff! If you enjoy very standard adventures you might consider this one. At only £4.95 it is one of the cheaper games available, but with software you usually get what you pay for.

Champions is yet another version of the game where you are a football manager and have to take decisions about your club's future. The game, or simulation if you like, includes a transfer market to buy and sell your players, suspensions, injuries, the league tables and a weekly news page which shows things such as the gas bill (which appears rather regularly) and many other monetary transactions, plus the occasional humorous comment about Jimmy Hill.

You begin in division four (I haven't managed to get out of that one yet) and you can apparently take your team all the way to the cup.

The game would have been vastly improved with some graphic representation of the weekly games — the league tables just appearing after pressing *P* is not very exciting. Instructions are given clearly on the cassette insert which includes a B/W photo. All commands are mainly one-key

entry and are menu selected, so there is no trouble finding the right one

If you are a soccer fan you will probably love this game if you are not you may still find it enjoyable to play as the whole situation depends on your decisions (and a bit of luck of course) In any case for only £5 95 it is generally good value for money It is interesting to note that the game is also available for the ZX81 and BBC model B

Death s Head Hole is a role play/adventure game and is certainly the most original I have yet seen The instruction sheet is well written and explains the use of single-key commands eg *N* — go north, *F* — eat food Also included is a graphic map which is only partially complete To play the game it is essential that you mark the passages on this map or on some graph paper

The game involves rescuing three pot holers who are lost somewhere in the passages The screen shows equipment, fitness lights and a brief description of where you are and what is north south east and west eg, *'Stream passage north sump south*

The program is very realistic and enjoyable One feature I particularly liked was the way passages can become blocked, and sumps formed while you are playing so you can t always get out the way you came The messages which appear do not always fit on the line, meaning that words are split making the presentation appear messy but this is a minor point

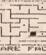
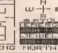
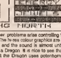
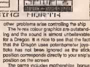
Playing the game takes at least 30 minutes and if you do manage to save all three pot holers you are immediately sent back in without new supplies to find three more The passages do sometimes contain food or equipment dumps where you can get much-needed supplies to survive a bit longer I found *Death s Head Hole* challenging and fun to play and at £5 45 it is recommended to all role players

. . . less than spectacular . . .

There were two arcade style games included in this review The first was *Alien Blitz* from Gem It is well packaged and comes on a top-quality cassette which loaded every time From then on things begin to slide The game is a version of the tired *City Bomber* type where you as the pilot of an alien ship must mindlessly flatten a city in order to land This version which for some reason uses black and white graphics only, is one of the worst I have seen The graphics are flickery and not particularly realistic There are three levels of play, but these only count when you land The occasional beep is the only resort made to sound and the explosion if you crash is less than spectacular

At £7 95 this program is excessively over-priced and certainly is not of the standard of Gem's other game, *Sultan s Maze*



What could be more different in quality to *Alien Blitz* than *Invaders Revenge* from Microdeal It is another game converted from the TRS-80C computer and written in machine code The game is a nice twist on the old *Space Invaders* theme This time you are the invader who must destroy the earth s ships that "prowl the space lanes" and avoid the laser base which is controlled by the computer

Very extensive instructions are included in the program (six screen fulls) and several options can be made — joystick or keyboard, one or two players, number of shbis on the screen at one time, and overall speed The only bug I have found is in the two-player game with joysticks — if one player gets more bonus ships than the other problems arise controlling the ship

The hi-res colour graphics are outstanding and the sound is almost unbelievable for a Dragon It is nice to see that the fact that the Dragon uses potentiometer joysticks has not been ignored as the stick position corresponds directly to your ship's position on the screen

The game includes motherships bonus ships at every 10,000 points and an ever-increasing speed After 15,000 the game is almost suicidally fast Pressing *P* freezes the action while you answer the phone and pressing *R* in response to "Number of Shots?" allows you to reselect one or two players (the *R* command was missed out of all of the instructions and was found accidentally)

Eight pounds for a game of this quality is real value for money *Invaders Revenge* is, in my opinion one of the best games yet to appear for the Dragon and joins games such as *Donkey King* as another of Microdeal s excellent programs Other manufacturers should take note of Microdeal as their programs are top quality and the mail order department works by return of post in most cases

By their very nature adventure games do not often exploit a machine to its full The games reviewed here range from bad to very good but all prices are low compared to other machines in this range and this can only be good news for Dragon owners

When buying arcade games, it is always difficult to tell from advertisements how good a game really is — "Excellent graphics and sound" seems to be applied to anything these days If possible see a demonstration of the game in a shop before buying

Nine months after launch, the Dragon is starting to be complemented with more software, the quality of which is generally good — a good thing for the 40 000+ Dragon owners out there ■

Firm	Program	Cost	Value (1-10)
Salamander Software 27 Ditchling Rise Brighton BN1 4QL	*Vulcan Noughts and Crosses*	£7 95	[illegible]
Gem Software 22 Prestwick Drive Bishop s Stortford CM23 5ES	*Sultan s Maze*	£7 95	[illegible]
	Alien Blitz	£7 95	[illegible]
Compusense 286D Green Lanes PO BOX 169 London N13 5TN	*Pirates Ahoy*	£7 95	[illegible]
Apex Trading 115 Crescent Drive South Brighton BN2 6SB	*Pharaoh s Curse*	£4 95	[illegible]
Peaksoft 7 Hawthorn Crescent Burton-on-Trent DE15 9QP	*Champions*	£5 95	[illegible]
	Death s Head Hole	£5 45	[illegible]
Microdeal 41 Truro Road St Austell Cornwall PL25 5JE	*Invaders Revenge*	£8 00	10

A timely reminder!

Malcolm Davison *presents two timing programs which can be used for boiling eggs or developing photographs*

One of the more discreet improvements of the Spectrum computer over its predecessors is the introduction of crystal-controlled oscillators into the circuitry. Apart from regulating tape operations, timing the Beep statement, pacing the microprocessor and colour mixing operations it gives the user access to what can loosely be described as a 'real-time' clock. I say loosely, because its timing is interrupted by Beep and tape operations. Despite this qualification, it still offers possibilities of games 'against the clock' or to use the computer in timing applications.

Additional plug-in hardware is necessary to directly control electrical apparatus. While controlling your central heating or video recorder may not be priority uses for your Spectrum — the occasional use as a timer for photographic enlargers, to synchronise a slide show, or control your model railway might be seriously considered by some users.

Even without this hardware link, the timing facility may be usefully incorporated into a recipe program to steer a chef through the complexities of Cordon Bleu cooking, perhaps incorporated into 'cost-of-call' telephone charge program, or in a chess tournament clock program. Here are two programs which may be of use, and will help steer you round the printing errors in the relevant but brief section in the Spectrum manual.

The first program, *Timer*, is a general purpose timing program which could be used for anything from timing your boiled eggs for breakfast, to reminding you to switch on your favourite tv programs. The program simply asks how many minutes you want timed (up to an hour is accepted) and timing commences once you hit *Enter* — an alarm sounds at the completion of the elapsed time.

The second program is a versatile process timer routine. Keen photographers who do their own colour processing will know that to repeatedly time three or more processes for the same time-intervals is a bore and it is not difficult to forget at what stage you are in the sequence. This program solves the problem — it will time up to ten consecutive processes (although this could easily be extended) — each up to an hour in length.

The program keeps you informed of which process is in operation, how long the process is and how long has elapsed since it started. An alarm sounds at the end of each process, the screen flashes and, after a suitable interval when all the processes are complete, the program can be reset to the first process again. All this cannot be done by even the most expensive commercial laboratory timers, even if their accuracy is marginally better.

I have found the program to gain about one second every ten minutes which for most purposes will be of little consequence (typical photographic processes are only 2-3 minutes). By the way, I hardly need remind keen photographers to keep the television well away from unexposed colour enlarging paper!

The program no doubt has other uses, for example, as a conference timer, or it may have an application in some sporting events where competitors have individual time handicaps to complete a course. You may find the border flash routine (lines 625-655) a useful attention-getter for your programs — and I find it preferable to flashing the words you are trying to read or the area immediately around it.

Both programs make use of the 'double-take' time evaluation suggested in the Spectrum manual. ■

```
  1 REM "timer"
  3 INK 1: PAPER 6: BORDER 1: C
LS
  5 INPUT "How long to be timed
? (in mins)";x
  6 LET x=INT (x*60+.5)
  7 LET l=0: LET m=0: LET n=0:
LET o=0
  8 LET r=0: LET t=0: LET s=0
  9 POKE 23674,0: POKE 23673,0:
 POKE 23672,0
 20 DEF FN u()=INT ((65536*PEEK
 23674+256*PEEK 23673+PEEK 23672
)/50)
 50 LET s=FN u(): LET t=FN u()
 55 LET t=(s+t+ABS (s-t))/2
 58 IF t<r THEN GO TO 50
 60 LET o=o+1
 67 IF o<10 THEN GO TO 79
 68 LET n=n+1: LET o=0
 69 IF n<6 THEN GO TO 79
 70 LET m=m+1: LET n=0
 71 IF (l*10+m)=60 THEN GO TO 7
 72 IF m<10 THEN GO TO 79
 73 LET l=l+1: LET m=0
 79 PRINT AT 8,13;l;m;":";n;o
 80 LET r=r+1
 85 LET x=x-1
 88 IF x=0 THEN GO TO 95
 91 GO TO 50
 95 PRINT AT 16,12; FLASH 1;" T
IME UP "
 96 FOR e=1 TO 20: BEEP .05,20:
 BEEP .05,25: BEEP .05,20: NEXT
e
 97 PAUSE 500: FLASH 0: CLS
```

```
  1 REM "photolite"
  3 INK 7: PAPER 0: BORDER 0: C
LS
  5 GO TO 200
  7 LET l=0: LET m=0: LET n=0:
LET o=0
  8 LET r=0: LET t=0: LET s=0
  9 POKE 23674,0: POKE 23673,0:
 POKE 23672,0
 20 DEF FN u()=INT ((65536*PEEK
 23674+256*PEEK 23673+PEEK 23672
)/50)
 50 LET s=FN u(): LET t=FN u()
 55 LET t=(s+t+ABS (s-t))/2
 58 IF t<r THEN GO TO 50
 60 LET o=o+1
 67 IF o<10 THEN GO TO 79
 68 LET n=n+1: LET o=0
 69 IF n<6 THEN GO TO 79
 70 LET m=m+1: LET n=0
 71 IF (l*10+m)=60 THEN GO TO 7
 72 IF m<10 THEN GO TO 79
 73 LET l=l+1: LET m=0
 79 PRINT AT 8,16;l;m;":";n;o
 80 LET r=r+1
 85 LET x=x-1
 88 IF x=0 THEN RETURN
 91 GO TO 50
 94 REM
 95 REM ***********************
 96 REM
200 LET procno=0: LET proctim=0:
 LET y$=""
210 DIM l(10): DIM p(10): DIM p
$(200)
220 LET lgth=1
230 INPUT "How many processes a
re there?";procno
235 IF procno>10 THEN GO TO 230
250 INPUT "What is the name of
the first   process?";y$
255 LET l(1)=LEN y$
257 LET p$(lgth TO lgth+LEN y$-
1)=y$
258 LET lgth=lgth+LEN y$
270 FOR w=1 TO procno
275 IF w=1 THEN GO TO 290
280 INPUT "What is the name of
the next    process?";y$
285 LET l(w)=LEN y$
287 LET p$(lgth TO lgth+LEN y$-
1)=y$
288 LET lgth=lgth+LEN y$
290 INPUT "How long is this pro
cess?";proctim
295 IF proctim>60 THEN GO TO 29
0
300 LET p(w)=proctim
310 NEXT w
400 LET lgth=1
405 FOR v=1 TO procno
406 LET lgth=lgth+l(v)
410 NEXT v
490 REM
495 REM ***********************
497 REM      Process timing
498 REM ***********************
499 REM
500 LET lgth=1: LET x=0
501 PAPER 5: INK 7: BORDER 5: C
LS
502 FOR v=1 TO procno
505 LET y$=p$(lgth TO (lgth+l(v
)-1))
610 PAPER 3: CLS : PRINT AT 18,
7;"Press any key when"
621 PRINT AT 11,16-(LEN y$)/2;y
$
640 PRINT AT 10,8;" is commencin
g"
615 LET lgth=lgth+l(v)
620 PAUSE 0: CLS
630 CLS : PRINT AT 8,16-(LEN y$
)/2;y$
631 PAPER 1: INK 7: CLS : PRINT
 AT 9,10;"in process"
632 PRINT AT 15,8;"(length ";p(
v);" mins)"
640 LET x=INT (p(v)*60+.5)
650 GO SUB 7
660 CLS
661 PRINT AT 11,16-(LEN y$)/2;y
$
665 PRINT AT 13,10;" is finished
"
668 GO SUB 600
670 NEXT v
675 PAUSE 500
680 CLS : PAPER 0: INK 7: CLS :
PRINT AT 10,1;"Press to reset (
)side sequence": PAUSE 0
690 CLS : GO TO 500
695 REM
696 REM ***********************
697 REM      Alarm routine
698 REM ***********************
699 REM
600 BORDER 0
605 FOR w=1 TO 10
610 BEEP .1,20: BEEP .1,20: BEE
P .1,30
620 NEXT w
625 FOR e=1 TO 5
630 BORDER 2: PAUSE 10
640 BORDER 7: PAUSE 10
650 NEXT e
655 BORDER 0
660 RETURN
```

The art of design

***B D Skinner** explains how to design programs from the top down*

TDSP (Top Down Structured Programming) is the acronym given to a way of writing good programs Program design is an art and too many would-be programmers spend hours debugging programs which have been invented at the keyboard

Program design should begin with defining the aims of the program Once the 'problem space' has been defined, the solution may be set out in a flowchart which represents the algorithm chosen Then once the problem and its solution have been broken down into small parts, coding — putting the algorithm into a computer language such as Basic — can begin Finally and perhaps least importantly, you can enter and test the code

Central to the TDSP approach is the concept of a routine A routine is simply a set of instructions which perform some task — micros have a machine code routine to clear the screen which can be 'called up' by typing the correct command

Similarly programs should be designed such that they are a collection of routines in Basic which can be called up within the body of a program itself Thus for example we may define a 'subroutine' within a program which clears the screen (using the operating system command above) and then draws a border at the screen margins Such a routine could then be called up prior to the displaying of other information such as a 'menu' of user options

Subroutines are easy to define in Basic — it a little confusing at first To begin with, nothing need mark the start of a subroutine — it is a good idea to make full use of Rem statements to identify each subroutine For the more advanced programmer this also means that you can jump into a subroutine anywhere The end of a subroutine must, however be marked by a *Return* statement

Let us now look at the coding of a subroutine to provide a pause in a program The 'heart' of the subroutine will be an 'empty' *For Next* loop which will instruct the computer to perform a set of operations a certain number of times In this instance, we will instruct the computer to do nothing several times. Such a loop would take the form

```
1010 FOR PS = 1 TO 2000
1020 NEXT PS
```

When these lines are encountered the computer will 'twiddle his thumbs' 2000 times then carry on with the next line To turn these two lines into a usable subroutine we must add the next line — a *Return* statement — and a Rem statement to remind us of the function of the lines

```
1000 REM PAUSE SUBROUTINE
1010 FOR PS = 1 TO 2000
1020 NEXT PS
1030 RETURN
1040 REM END OF PAUSE SUBROUTINE
```

Now, whenever we want a pause in a program, we simply call up this subroutine with the statement *Gosub 1000* — the program will then 'loop' or 'branch' down to line 1000, perform 2000 *For Next* loops and then return to the statement after the *Gosub* command which called the subroutine

Obviously, if we wanted to double the length of the pause we simply call the routine twice

```
100 GOSUB 1000
110 GOSUB 1000
```

This is however clumsy and poor practice — what we really require is a pause routine of variable length so that we can have a long pause or a short one, both mediated by the same subroutine This is quite easy all we need do is to introduce a variable into the program — let us call it *PL* to stand for *Pause Length* We now need to alter line 1010 to read.

```
1010 FOR PS = 1 TO PL
```

Now we must remember to define PL before calling the subroutine for example for a short pause we might write

```
200 LET PL = 500
210 GOSUB 1000
```

while for a longer pause we might write

```
300 LET PL = 5000
310 GOSUB 1000
```

While this technique of passing variables to subroutines is very useful it does mean that we must be quite careful not to use the variable *PL* for any other purpose in a program or we will get some odd results

Practically speaking pauses are of little value in programs It is far better psychologically to prompt the user to press a key before the program carries on In order to do this we want the program to display a message which does not interfere with whatever is already on the screen — so we can reserve the bottom line for this purpose Secondly we must define which key is to be used — the space bar is convenient — and finally the program should only recognise a press of this key as a 'user response' The next stage is to draw up the flowchart which represents a solution to this program

Coding this algorithm is now relatively simple, but since screen-handling is perhaps one of the most marked differences between the dialects of Basic, you may have to consult your users manual for the exact phrasing of this example for it to run on your machine This version is written for the Dragon 32

```
9000 REM PRESS SPACE TO CONTINUE
9010 PRINT @ 480 "PRESS THE SPACE BAR TO
     CONTINUE"
9020 A$ = INKEY$
9030 IF A$<>CHR$(32) THEN GOTO 9020
9040 RETURN
9050 REM END OF SUBROUTINE
```

Line 9010 presents the message starting at screen position 480 — the bottom left-hand corner of the screen Line 9020 reads the keyboard and sets *A$* to whatever key (if any) has been pressed while line 9030 tests A$ to see if it is a space Line 9030 also passes control back to line 9020 if *A$* was not a space Line 9040 returns control to the statement following the *Gosub 9000* which called up the subroutine

You could also add *9035 Print @ 480, String$(31,32)* which will clear the message before the *Return* is executed ■

Law of averages

***Calvin Woodings** explains how to detect variations in data with time series plotting*

This program enables you to detect variations in data by plotting results in two different ways. The first is the straightforward time series (or control chart) where results are plotted as they arise, and the second utilises the Cumulative Sum (or Cusum) technique, this being a particularly powerful way of highlighting small changes in a series of results. Examples of both techniques are given below, figures 1 and 2 illustrating how the program plots the time series and the cusum respectively.

The data was gathered by measuring rods produced by an automatic cutting machine. Samples were taken every hour over a 40-hour period — figure 1 is a graph of the actual results of rod length in inches against time for the 40 samples. The *X* axis is drawn at a point on the *Y*-axis corresponding to the average rod length.

The scatter of results is seen to be from 97 to 104 inches with a mean value of just over 100. You can probably just detect the hint of a change in average rod length occurring at about one hour 20, but unfortunately the scatter of results makes it difficult to be certain about this. This is where the Cusum plot shown in figure 2 comes to the rescue.

Figure 2 is obtained from the same set of rod lengths, but the points plotted arise from the following calculations.

i) The average rod length (*mean*) is calculated from all 40 results.

ii) The average is subtracted from the first result and the difference obtained is plotted ($Y1 = result1 - mean$)

iii) The average is subtracted from the second result — this difference is added to the first difference, and this sum is plotted as the next point ($Y2 = Y1 + result2 - mean$)

iv) This process is repeated for each result, the graph thus being a graph of the accumulated sums of the differences between each result and the average [$Y(n) = Y(n-1) + result(n) - mean$]

When interpreting a Cusum from this program several points need to be borne in mind. The first is that the *X* axis is always plotted at the mean value which in *Y* axis Cusum units is zero. From this base, any upward run of results indicates a sequence of above average results, but not necessarily a sequence of increasing results. Similarly, a downward sloping plot indicates a sequence of below average results, but not necessarily a diminishing sequence.

Any sharp change of slope indicates a significant change in the overall level of results at the point in time where the sharp change occurred. Gradual slope changes (ie, curved graphs) suggest an increasing or decreasing sequence of results. (Try plotting numbers from 1 to 20. This gives a straight line in the time series but a smooth curve in the Cusum plot.)

Looking at figure 2, we can therefore deduce the following:

i) There was a significant change of level of rod lengths at about result 21. Something happened at this time either on the machine or in the measurement process.

ii) Prior to this, the generally upward run of points between 1 and 21 show that the lengths were generally above average, and by inspection you can see that with an accumulated difference of 19 *(peak on Y-axis)* being reached at hour 21, the lengths were running at 1.1 inches above the overall average value of 100.2 inches.

iii) After the peak, the accumulated difference falls to zero again in the space of the next 19 samples. Thus the lengths were generally below average, by about 1 inch over the period.

All Cusum plots calculated using the average as a base value will start and end on the baseline, ie, an accumulated difference of zero. However, in some applications the average is never known because the results are added to the graph as they come in, and hence a base value has to be chosen arbitrarily. If the base value turns out to be significantly above or below the average which emerges, then the Cusum plot will tend to move generally downwards or upwards respectively. This can make plotting within the confines of a CRT difficult when more than a few results are involved!

Program Notes

The main program resides between lines 50 and 220. Lines 230 to 850 contain the utility procedures which, but for minor alterations, are the same as those used in previous programs in this series. If you have already typed them in once for a previous program, you should start by loading them, renumbering them and editing them as appropriate.

Procchoice simply allows you to select the type of plot you wish to use. *Procanalysis* calculates the average, the Cusum points (line 1000) and the factors which enable the graphs to be fitted tidily on to the screen (*Yser, Ycus* and *Xscale*).

Procplot (B$) draws the graph as required by the parameter B$, which is given the value of 'cusum' or 'series' by line 140. Line 1130 sets the graphics origin according to the need to draw the *X* axis at the average value for the series plot and at the zero value for the Cusum. Line 1150 sets the starting point for plot at 0,0 for the Cusum, and at the right position for the first result in the series plot.

The loop between lines 1160 and 1190 draws the lines which link up the plotted points, and the loop from lines 1210 to 1250 labels the *X*-axis. Line 1270 puts the scale on the *Y*-axis, and *Proclabel* prints the *Y*-axis label down the left-hand side of the screen in a position where it won't clash with the *Y*-axis scale.

Scale formatting is controlled by the "*@%=&307*" at line 1100, and by the "*Move-250*" in line 1270. ■

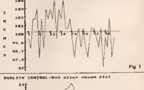


Fig. 1

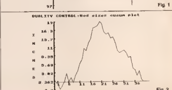


Fig 2

```
L.
   10  REM STATISTICS/TIME SERIES PLOTS
   20  REM (C) C.R.WOODINGS/APRIL 1983
   30  REM FOR BBC MICRO MODEL B
   40
   50 DIMdata(99),cusum(99)
   60 ONERRORCLS:PRINTTAB(14,10)"ESCAPE PRESSED?":GOTO160
   70 MODE7:PROCtitle:CLS
   80 PRINTTAB(5,10)CHR$132"Enter the title of the graph "
   90 PRINTTAB(10,12);CHR$132;:title$=FNinput(25,31,127)
  100 CLS:PRINTTAB(0,10)CHR$132"Enter Y-axis label (Up to 8 characters)"
  110 PRINTTAB(15,12);CHR$132;:label$=FNinput(8,31,127)
  120 MODE1:PROCdataload
  130 MODE1:PROCanalysis:COLOUR2
  140 IF FNchoice(3,12,"(T)ime series or (C)umulative sum? ") THEN PROCplot("series") ELSE PROCplot("cusum")
  150 REPEATUNTILGET
  160 @%=10:IF NOT FNyes_no(12,"Another run ") THEN 210
  170 CLS:PRINTTAB(0,12);:IF FNyes_no(4,"Use the same data again ")GOTO130
  180 CLS:PRINTTAB(0,12);:IF NOT FNyes_no(12,"Edit the data") THEN 200
  190 PROCreview:GOTO130
  200 CLS:RUN
  210 MODE7:PROCdouble_height(8,"BYE",132)
  220 END
  230
  240 DEFPROCtitle
  250   PROCdouble_height(8,"STATISTICS",132)
  260   PROCdouble_height(12,"Time-series Plotting",131)
  270   PROCcontinue
  280 ENDPROC
  290
  300 DEFPROCdouble_height(row,words$,colour)
  310   column=INT((40-LEN(words$))/2)-2
  320   FOR I=row TO row+1:PRINTTAB(column,I);CHR$141;CHR$colour;words$
  330   NEXT
  340 ENDPROC
  350
  360 DEFFNyes_no(x,A$)
  370   LOCAL ans:PRINT:PRINTTAB(x)A$;" (Y/N) ? ";
  380   REPEAT:ans=(GET AND &DF):UNTIL ans=&59 OR ans=&4E:PRINTCHR$ans
  390 =(CHR$ans="Y")
  400
  410 DEFPROCcontinue
  420   PRINT
  430   PRINTTAB(7,23)"Press any key to continue ";:REPEATUNTILGET
  440 ENDPROC
  450
  460 DEFPROCdataload
  470   CLS:COLOUR 2:PRINTTAB(14,2)"DATA LOADING"
  480   PRINTTAB(2,4)"Expressions are accepted: End with 00"
  490   COLOUR 3:VDU28,0,31,39,6:K=1
  500   PRINTTAB(9)"Max. no of results ? ";
  510   array=VAL FNinput(2,39,58)
  520   REPEAT
  530   data$="":PRINTTAB(12)"RESULT ";K;" = ";
  540   data$=FNinput(10,39,58):PRINT:data(K)=EVAL data$:K=K+1
  550   IF K>array THEN PRINTTAB(10)"Array full":PROCcontinue:K=K-1:GOTO570
  560   UNTIL LEFT$(data$,2)="00":K=K-2
  570   IF FNyes_no(10,"See and edit ") THEN PROCreview
  580 ENDPROC
  590
  600 DEFFNinput(len,loASC,hiASC)
  610   LOCAL K%,Z%:K%=0:in$=""
  620   REPEAT:Z%=GET
  630   IF Z%=127 AND K%>0 THEN K%=K%-1:in$=LEFT$(in$,K%):VDUZ%
  640   IF Z%>loASC AND K%<len AND Z%<hiASC THEN K%=K%+1:in$=in$+CHR$Z%:VDUZ%
  650   UNTIL Z%=13 AND K%>0
  660 =in$
  670
  680 DEFPROCreview
  690   VDU26:CLS:COLOUR 2:PRINTTAB(14,2)"DATA EDITING:"
  700   COLOUR 3:VDU28,0,31,39,6:L=0:M=0
  710   REPEAT:CLS:FOR N=1 TO 10
  720   IF N+L=K+1 THEN 750
  730   PRINTTAB(12)"RESULT ";N+L;" = ";data(N+L)
  740   NEXT
  750   IF FNyes_no(10,"Change an entry") THEN PROCchange:GOTO750
  760   L=L+10:UNTIL N+L-11=K
  770   IF M>K THEN K=M
  780   IF FNyes_no(10,"Another look") THEN PROCreview
  790 ENDPROC
  800
  810 DEFPROCchange
  820   PRINTTAB(12)"Which number ?";:M=VAL FNinput(3,47,58):PRINT
  830   PRINTTAB(12)"New value ? ";:data(M)=EVAL FNinput(12,39,58)
  840 ENDPROC
  850
  860 DEFFNchoice(col,row,C$)
  870   LOCALans:CLS:PRINTTAB(col,row);C$;
  880   REPEAT:ans=(GET AND &DF):UNTIL ans=&54 OR ans=&43:PRINTCHR$ans
  890 =(CHR$ans="T")
  900
  910 DEFPROCanalysis
  920   sum=0:max=-1E37:min=1E37:maxval=-1E37:minval=1E37
  930   FOR N=1 TO K
  940   IF data(N)>max THEN max=data(N)
  950   IF data(N)<min THEN min=data(N)
  960   sum=sum+data(N)
  970   NEXT
  980   average=sum/K
  990   FOR N=1 TO K
 1000   cusum(N)=cusum(N-1)+data(N)-average
 1010   IF cusum(N)>maxval THEN maxval=cusum(N)
 1020   IF cusum(N)<minval THEN minval=cusum(N)
 1030   NEXT
 1040   Yser=860/(max-min)
 1050   Ycus=860/(maxval-minval)
 1060   Xscale=940/K
 1070 ENDPROC
 1080
 1090 DEFPROCplot(B$)
 1100   VDU28:CLS:COLOUR1:@%=&307
 1110   PRINT'title$;"  ";B$;" plot":GCOL0,2
 1120   MOVE234,0:DRAW234,900:MOVE238,900:DRAW238,0
 1130   IF B$="cusum" THEN VDU29,250;900-maxval*Ycus;:ELSE VDU29,250;900-(max-average)*Yser;
 1140   VDU5:MOVE0,0:DRAW1000,0:GCOL0,3
 1150   IF B$="cusum" THEN MOVE 0,0 ELSE MOVE Xscale,(data(1)-average)*Yser
 1160   X%=0:FOR N=1 TO K
 1170   X%=Xscale*N
 1180   IF B$="cusum" THEN DRAWX%,cusum(N)*Ycus ELSE DRAWX%,(data(N)-average)*Yser
 1190   NEXT
 1200   X%=0:GCOL0,2
 1210   FOR N=1 TO K STEP INT(K/10)+1
 1220   X%=Xscale*N
 1230   MOVEX%-16,12:PRINT"|"
 1240   MOVEX%-8,-16:PRINT;N
 1250   NEXT
 1260   FOR N=0 TO 8
 1270   IF B$="series"THEN MOVE-250,(min-average)*Yser+N*108:PRINTmin+N*(max-min)/8;"" ELSE MOVE-250,minval*Ycus+N*108:PRINTminval+N*(maxval-minval)/8;""
 1280   NEXT
 1290   PROClabel
 1300   VDU4,31,0,1
 1310 ENDPROC
 1320
 1330 DEFPROClabel
 1340   VDU26:GCOL0,1
 1350   D=LEN(label$):E=INT(9-D)/2
 1360   FOR N=1 TO D
 1370   MOVE0,(1020-E*108)-N*108:PRINTMID$(label$,N,1)
 1380   NEXT
 1390 ENDPROC
```


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Face the music . . .

Peter Chase *presents a series of machine code sound routines for the Dragon*

The Dragon has been accused of being a rather unsophisticated machine. For instance, the sound comprises single notes, the keyboard scanning using *Inkey$* has the limitation of only allowing one key to be pressed at a time, the use of colours is restricted, there are no true user-defined graphics and the scrolling movements of the screen are limited. With the help of machine-code routines, I will show you how the Dragon can be persuaded to do much more.

To write long sections of machine code you need to use assembly language. In an assembly language, each machine instruction is replaced by an instruction using a short word for the operation code (eg, for the 6809 chip in the Dragon these include *Add Inc* and amusingly *Bra* and *Sex*) and a letter or letters for the memory address. The assembler package then converts each instruction into the equivalent machine code.

The assembler package I use is *Dasm* from Compusense which is cartridge based and has the advantage that the assembly codes can be used with Basic — edited and saved using the normal commands. However if you do not wish to invest in an assembler as yet, I will also show how the machine code can be put into Basic programs using *Poke* and *Exec*.

First, some fun and games with the sound generator. The sound source is selected at locations FF23, FF01 and FF03. To select the six-bit source you need to clear bit 3 of FF01 and FF03 and set bit 3 of FF23. This can be done either with machine code, or with Basic by typing in the following lines each time the computer is switched on:

```
1 POKE &HFF23,PEEK(&HFF23) OR 8
2 POKE &HFF01,PEEK(&HFF01)AND 247
3 POKE &HFF03,PEEK(&HFF03)AND 247
```

The sound emitted is effected by the contents of FF20. Listing 1 shows how a very weird polyphonic sound can be produced by constantly loading FF20 with the contents of the timer (location 1313). It has to be heard to be believed. Listing 2 shows how to put in the machine code without an assembler.

If you wish to save just the machine code routine then use *Csavem "Sound", X,Y,Z* where *X* is the address of the beginning of the machine code (in this case &H6000), *Y* is the address of the end of the machine code and *Z* the difference between *X* and *Y*. The finish address can be found by printing out the contents of all locations from the start of the machine code.

Listing 3 is a subroutine to provide music in an assembly program. It should be called using *JSR @MUSIC*, having placed the value for the pitch in *X* with *Ldx* and putting the duration value into *Y* with *Ldy*. Incidentally, if you type in the listing alone and assemble and *Exec* it, a "walking" sound is produced because *X* and *Y* are cleared.

Listing 4 gives another unusual sound effect which can be produced using machine code. It can be typed in using the method shown in listing 2, if you do not have an assembler. The hex machine codes to be entered in line 150 are the second column of numbers starting 10,8E,00,01. ■

Listing One-Sound Demonstration

```
6001                    30     PRT
6001 B6FF23             30 @START  LDA  $FF23
6004 8A08               30     ORA  #8
6006 B7FF23             30     STA  $FF23
6009 B6FF01             30     LDA  $FF01
600C 84F7               30     ANDA #247
600E B7FF01             30     STA  $FF01
6011 B6FF03             30     LDA  $FF03
6014 84F7               30     ANDA #247
6016 B7FF03             30     STA  $FF03
6019 B6FF20             40 @LOOP   LDA  $FF20
601C BB0113             40     ADDA $113
601F B7FF20             40     STA  $FF20
6022 20F5               40     BRA  @LOOP
6024                    30     END  @START
```

Listing two

```
10 REM HOW TO PUT MACHINE CODE IN WITHOUT AN ASSEMBLER
20 REM
30 REM THIS PROGRAM WILL ADD THE SOUND DEMONSTRATION
40 REM
50 CLEAR1000,&H6000:REM RESERVE ENOUGH MEMORY FOR THE PROGRAM
60 I=&H6000:REM START-1
70 I=I+1
80 READA$
90 IFA$="Z"THEN1000
100 POKEI,VAL("&H"+A$)
110 GOTO70
120 REM
130 REM PROGRAM IN HEX
140 REM
150 DATAB6,FF,23,8A,08,B7,FF,23,B6,FF,01,84,F7,B7,FF,01,B6,FF,03,84,F7,
    B7,FF,03,B6,FF,20,BB,01,13,B7,FF,20,20,F5
160 DATAZ:REM TERMINATOR
1000 EXEC&H6001
1010 REM PROGRAM WOULD BE ABOUT 1000 BYTES
1020 END
```

Listing three-Music in machine code

```
6001                    31     PRT
6001 7FFF20             30 @MUSIC  CLR  $FF20
6004 7F0112             30     CLR  $112
6007 7F0113             30     CLR  $113
600A B6FF23             40     LDA  $FF23
600D 8A08               40     ORA  #8
600F B7FF23             40     STA  $FF23
6012 B6FF01             30     LDA  $FF01
6015 84F7               30     ANDA #247
6017 B7FF01             30     STA  $FF01
601A B6FF03             60     LDA  $FF03
601D 84F7               60     ANDA #247
601F B7FF03             60     STA  $FF03
6022 73FF20             70 @L  COM  $FF20
6025 3410               70     PSHS X
6027 301F               70 @DELAY  LEAX -1,X
6029 26FC               70     BNE  @DELAY
602B 3510               70     PULS X
602D 10BC0112           70     CMPY $112
6031 24EF               70     BCC  @L
6033 39                 70     RTS
6034 39                 60     RTS
6035                    60     END  @MUSIC
```

Listing four-Music demonstration

```
6004                    21     PRT
6001 108E0001           20 @START  LDY  #1
6005 8E0001             20 @DEMO   LDX  #1
6008 3121               20     LEAY 1,Y
600A 3001               24 @LOOP   LEAX 1,X
600C BD6019             24     JSR  @MUSIC
600F 8C00FF             00     CMPX #FF
6012 26F6               00     BNE  @LOOP
6014 20EF               24     BRA  @DEMO
6016 8624               30 @MUSIC  LDA  #$24
6018 B7FF20             30     STA  $FF20
601B 7F0112             30     CLR  $112
601E 7F0113             30     CLR  $113
6021 B6FF23             40     LDA  $FF23
6024 8A08               40     ORA  #8
6026 B7FF23             40     STA  $FF23
6029 B6FF01             50     LDA  $FF01
602C 84F7               60     ANDA #247
602E B7FF01             30     STA  $FF01
6031 B6FF03             60     LDA  $FF03
6034 84F7               60     ANDA #247
6036 B7FF03             60     STA  $FF03
6039 73FF20             70 @L  COM  $FF20
603C 3410               70     PSHS X
603E 301F               70 @DELAY  LEAX -1,X
6040 26FC               70     BNE  @DELAY
6042 3510               70     PULS X
6044 10BC0112           30     CMPY $112
6048 24EF               70     BCC  @L
604A 39                 30     RTS
604B 39                 60     RTS
604C                    30     END  @START
```

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

House of Horror

on ZX81

This is a game for a 16K ZX81 The aim is to go down staircases to the bottom of the house You start on the top floor as an "O

You must reach a staircase to get down to the next floor A staircase is an = sign and you will go down it automatically

There are 2 staircases on every floor You move right by pressing '2 and "1 to go left When trying to find a staircase you might come across a gap This is a pit you must jump over To do this you press "0" to jump right and "9" to jump left You jump a random number of steps.

Another lurking horror is a ghost which chases you If this gets too close then jump over it To make the game harder then leave out line 131

If you do finally get down the last ladder then your time will be displayed

The machine code in line 1 can be typed in as in the listings This is the line more clearly.

1 Rem (graphic shift 1,2+spaces E Function T ? Function E)

```
   1 REM "  2 RND?TAN
   2 POKE 16520,70
   3 POKE 16610,1
   4 FAST
   9 FOR S=2 TO 21 STEP 3
  10 FOR F=0 TO 30
  15 LET G=INT (RND*30)+2
  20 PRINT AT S,G,"■"
  30 NEXT F
  31 FOR N=0 TO 1
  32 LET K=INT (RND*30)+2
  33 FOR D=S TO S+2
  35 PRINT AT D,K,"="
  40 NEXT D
  41 NEXT N
  45 NEXT S
  50 LET A=1
  55 LET Z=30
  60 LET B=2
  70 FOR F=0 TO 21
  80 PRINT AT F,0,"■",AT F,31,"■
"
  89 NEXT F
  90 LET T=0
  95 PRINT AT 2,1,"■"
  98 SLOW
 100 PRINT AT B,Z,
 101 LET Z$=CHR$ USR 16514
 102 PRINT AT B,Z,"■"
 103 PRINT AT B,A,
 110 IF USR 16514=20 THEN GOSUB
300
 120 IF USR 16514=0 THEN GOSUB 3
00
 125 IF USR 16514=156 THEN GOTO
350
 130 PRINT AT B,A,"O"
 131 IF INKEY$="" THEN GOTO 131
 133 PRINT AT B,Z,Z$
 135 PRINT AT B,A," "
 140 LET A=A+(INKEY$="2")-(INKEY
$="1")
 145 LET Z=Z+(A>Z)-(A<Z)
 150 IF INKEY$="0" THEN LET A=A+
INT (RND*7+1)
 155 IF INKEY$="9" THEN LET A=A-
INT (RND*7+1)
 160 LET T=T+1
 170 GOTO 100
 293 STOP
 305 PRINT AT B,A,"O",AT B,A,"="
 306 LET B=B+1
 307 IF B)=23 THEN GOTO 800
 310 GOTO 100
 350 PRINT AT 0,0,"THE GHOST CAU
GHT YOU."
 360 GOTO 1000
 500 PRINT AT 0,0,"YOU ARE DEAD.
YOU FELL DOWN A PIT"
 505 FOR C=B TO B+2
 506 PRINT AT C,A,"O",AT C,A,"
 507 NEXT C
 508 PRINT AT C,A-2,"SPLAT"
 510 GOTO 1000
 800 PRINT AT 0,0,"WELL DONE.IT
TOOK YOU ",T," TIME"
1000 PRINT AT 1,0,"PRESS ANY-KEY
 FOR A NEW GAME."
1010 PAUSE 4E4
1020 CLS
1030 RUN
```

House of Horror
by M J Swallow

Space Zombies

on Vic20

This program is a space invader program for a Vic20 with a super expander or 3K Ram pack

The program uses the *Rjoy*(0) command of the super expander and so if you have got a 3K Ram pack this will have to be changed at lines 425-435

The program uses user defined graphics and some machine code to move the invaders

There is a barrier under the invaders and the only way to get past this is to shoot so it moves on to your bullet You have two minutes to score as much as possible

The *Rem* statements should be enough to see how the program works

PROGRAM OF THE WEEK

```
1 REM ####################
2 REM # ALAN BLACKHAM'S #
3 REM #  SPACE ZOMBIES  #
4 REM #    (16/02/83)   #
5 REM ####################
6 REM
10 POKE36879,8
12 POKE 36878,15
15 REM
16 REM #### INSTRUCTIONS ####
17 REM
20 PRINT"3## #                     #'
22 PRINT" #   SPACE ZOMBIES    #'
25 PRINT" #                    #'
30 PRINT"# SHOOT THE ■SPACE        ZOMBIES■ BEFORE YOUR
   TIME RUNS OUT."
32 PRINT"■ IF YOU COME CLOSE      THEY WILL DISAPEAR"
33 PRINT" BUT YOU WONT SCORE!"
35 PRINT"X■ YOU HAVE 2 MINS       TO DO IT."
40 PRINT" USE THE KEYS -"
42 PRINT"X■  Z = LEFT"
43 PRINT"■  C = RIGHT"
44 PRINT"■  M = FIRE"
45 PRINT"X■ OR USE THE JOYSTICK"
50 PRINT"X■      PLEASE WAIT      "T"
100 REM
101 REM #### MACHINE CODE ####
102 REM
105 I=6400
107 READ A IFA=-1THEN 120
110 POKE I,A I=I+1
115 GOTO 107
120 REM
121 REM #### CHARACTERS ####
122 REM-SLAP HEAD TED-
123 POKE 52,28 POKE56,30
125 I=7168
130 READ A IF A=-1 THEN 200
135 POKE I,A I=I+1
140 GOTO 130
150 REM ## DATA FOR MACHINE CODE ##
152 DATA 162,0,232,189,22,30,157,21,30,224
154 DATA 23,240,3,76,2,25,173,22,30,141
156 DATA 43,30,162,21,202,189,86,30,157,87
158 DATA 30,224,0,240,3,76,24,25,173,87
160 DATA 30,141,66,30,162,0,232,189,110,30
162 DATA 157,109,30,224,22,240,3,76,46,25
164 DATA 173,110,30,141,131,30,162,21,202,189
```

Continued over the page

```
166 DATA 154,30,157,155,30,224,0,240,3,76
168 DATA 56,29,173,175,30,141,154,30,162,0
170 DATA 232,189,190,30,157,157,30,224,22,208
172 DATA 3,76,90,25,173,190,30,141,219,30
174 DATA 162,21,202,189,0,31,157,9,31,224
176 DATA 0,240,3,76,112,28,173,29,21,141,0,31,96,0,-1
180 REM ** DATA FOR CHARS **
182 DATA 0,0,24,36,255,66,36,24,16,122,255,255,126,126,
    60,16
184 DATA 0,0,16,124,84,254,254,170,24,36,36,126,235,120,
    36,60
186 DATA 36,24,60,255,60,24,36,36,0,0,0,0,60,255,255,0
190 DATA 16,16,16,16,124,146,254,170,-1
200 PRINT"■    PRESS ANY KEY    "
205 GETA$ IFA$=""THEN205
210 REM
212 REM **** SET UP SCREEN ****
213 REM
220 POKE 36869,255
225 PRINT"■■                         ",
227 PRINT"■■   ■■■ ■■■ ■■■  ■■■  ■■■  ■■■  ■■■",
228 PRINT"■                          ",
230 PRINT"■■ ■■■ ■■■  ■■■ ■■■  ■■■  ■■■ ■■■  ■■■ ",
231 PRINT"■                          ",
232 PRINT"■■ ■■■ ■■■ ■■■ ■■■ ■■■ ■■■ ■■■ ■■■ ■■■ ■■■ ",
233 PRINT"■                          ",
234 PRINT"■■ ■■■   ■■■ ■■■    ■■■  ■■■   ■■■  ",
235 PRINT"■                          ",
236 PRINT"■■ ■■■      ■■■ ■■■    ■■■ ■■■ ■■■ ■■■ ",
237 PRINT"■                          ",
238 PRINT"■                          ",
239 PRINT"■■  ■EEEEEG     ■EEEEEG      ",
240 FOR I=1 TO 8
243 PRINT"■                          ", NEXT
250 PRINT"■■                          ■",
252 PRINT"■■────────────────────────■",
255 PRINT 8180,2■■
300 REM
302 REM **** INISIALISE ****
304 MEM
305 G=8153
307 B=7680
310 TI$="000000"
320 POKE 0,6
400 REM
402 REM **** GAME ****
403 REM
405 PRINT"■■SCORE ",SC," TIME ",RIGHT$(TI$,4)
425 J=JOY(0) K=PEEK(197)
427 POKE 0,160
430 IF J=4 OR K=33 THEN G=G-1
435 IF J=8 OR K=34 THEN G=G+1
440 IF B>7680 THEN 445
441 IF J=128 OR K=36 THEN POKEB,160 B=G-88 S=128
442 IF G=8141 THEN G=8142
443 IF G=8160 THEN G=8162
445 POKE G,6
446 IF B<7680 THEN POKE36876,0 GOTO 505
447 FOR I=1 TO 5
450 IF B>7679 THEN POKEB,160 B=B-22 S=S+5 POKEB,174
451 POKE 36875,S
452 K=PEEK(B-22)
455 IF K>5 THEN POKE 36876,0 GOTO500
456 POKE 36876,200
457 POKE 36879,25
460 IF K=5 THEN 487
465 IF K>4 THEN 485
470 SC=SC+(50-(K*10))
480 POKE B-22,160
487 POKE B 150
489 S=0 B=7679
497 POKE 36879,8
500 NEXT I
505 IF B<7680 THEN S=0
510 POKE 36875,S
520 IF VAL(TI$)>200 THEN 600
530 IF Z=2 THEN Z=0 POKEB,160 SYS6400 POKE36877,128 FOR
    R=1TO40 NEXT POKE36877,0
535 Z=Z+1
540 GOTO 400
600 REM
602 REM **** TIME UP ****
605 REM
610 POKE 36869,240
615 SOUND0,0 0,0,15
620 PRINT"■■■  YOUR TIME IS UP!"
625 PRINT"■ ──────────────"
630 PRINT"■■■ YOU SCORED ",SC
640 IF SC>HSTHEN HS=SC
650 PRINT"■■■ THE HIGH SCORE IS      ",HS
660 PRINT"■■■ ANOTHER GAME(Y OR N)?"
670 GETA$ IFA$=""THEN670
680 IF A$="N"THEN POKE36879,27 END
690 IF A$="Y"THEN SC=0 GOTO220
695 GOTO 670
```

Space Zombies
by Alan Blackham

Random Number

on Spectrum

I needed a random number generator for my games in machine code and this is my solution The data can be stored anywhere in memory can have any maximum value and up to 255 pieces of data

Code

Random number generator for ZX-Spectrum

```
     LD A, (23672)
     LD L, A
     LD A, (23672)
     AND 31
     LD H, A
     LD DE, 20000
     LD B, 0
Loop LD A, (HL)
     AND 127
     LD (DE), A
     INC DE
     INC HL
     DJNZ loop
     RET
```

The DE register points to a location in memory where the data will be stored

The BC register holds the number of pieces of data needed

The HL register points to a random location in Rom

The AND statement after 'LD A, (HL)' is used to limit the maximum value of the data

Here is a decimal dump of the code This has been placed at location 30000

Decimal listing

30000	58	30018	16
30001	120	30019	16
30002	92	30020	35
30003	111	30021	16
30004	58	30022	246
30005	120	30023	201
30006	92	30024	0
30007	230	30025	0
30008	31	30026	0
30009	103	30027	0
30010	17	30028	0
30011	56	30029	0
30012	117	30030	0
30013	6		
30014	5		
30015	130		
30016	230		
30017	127		

Random Number
by Paul Frewin

Lander

on Dragon

The object of the game is to land your space module on the green landing pad using a joystick to control the horizontal motion. After a safe landing the game continues with the space module descending at a greater speed.

The aim is to score as many points as possible by landing safely. If the landing pad is missed the game is over and "YOU CRASHED" is displayed.

When you are within 20 miles of the pad your retro rockets can be activated by the fire button on the joystick.

The use of the retro rockets is essential when you are travelling at more than 10 miles per time unit.

A speed prompt of 1 is useful to obtain an idea of the game but subsequently starting speeds of 4 or greater are recommended. The number input at the speed increase prompt should be between 1 and 6.

Program notes

30 40	Prompts
50	Delay loop
60	Set position variables
80-90	Hi-res graphics
95	Set second speed variable
100 140	Hi-res graphics
150 170	Movement routine
180 190	Check retros
200	Sound
210 250	Crash or land routines
260 270	Anti FC error routines
1020-1036	Reset variables
1040	Display points

Variables

X and Y	Module coordinates
S	Speed
V	Speed increase
J	Delay variable
SR	Back-up speed variable
W	Check fire button
M	Retro variable
B	Score

SR is a back-up variable to ensure that the retros do not inhibit your speed for the next flight.

```
10REM "LANDER" BY R.G. BASSETT
20REM POPULAR COMPUTING WEEKLY
25 REM MUULDER PAK PRINTING
30 INPUT "SPEED 1-20";S
40 INPUT "SPEED INCRESE";V
50 FOR J=1 TO 400:NEXT J
60 X=100:Y=10
70 PMODE 3:PCLS 3:SCREEN 1,0
80 LINE (0,180)-(252,180),PSET,BF
90 LINE (100,180)-(120,185),PRESET,BF
95 SR=S
100 LINE(110,180)-(110,182),PSET
110 CIRCLE (X,Y),5,2
120 PAINT (X,Y),2,2
130 CIRCLE (X,Y),7,3
140 PAINT (X,Y),3,3
150 Y=Y+S
160 IF JOYSTK(0)<32 THEN X=X-8
170 IF JOYSTK(0)>32 THEN X=X+8
180  W=PEEK (65280)
190 IF W=126 OR W=254 THEN M=1:IF Y>160
    THEN M=M+1:IF M=2
200 SOUND RND(255),1
210 IF X<100 AND X>0 AND Y>180 THEN 1050
220 IF X<252 AND X>120 AND Y>180 THEN 1050
230IF X<120 AND X>100 AND Y>180 THEN 1010
240 CLS
250 IF X>252 OR Y>188 THEN GOTO 1050
260 IF X<0 THEN X=0
270 IF Y>0 THEN Y=0
1000 GOTO 110
1010 PRINT"WELL DONE"
1020 S=SR
1030 B=B+1
1035 S=S+V
1036 M=0
1040 GOTO 50
1050 PRINT"YOU HAVE CRASHED"
1060 PRINT"YOU SCORED"B"POINTS"
1070 GOTO 10
```

Lander
by R Bassett

Goblets

on BBC Micro

This graphics program draws three dimensional goblets shaded so that it appears as if there is a light shining on them.

This program is designed for use on a black and white TV so if you are using a colour set turn the colour down. It runs on a 32K BBC micro.

```
:LIST
   10REM H1%=HIGHT UP SCREEN H2%=
ACTUAL HIGHT S1%=RADIUS AT TOP S3%=
RADIUS AT BACE
  110*TV255
  210MODE2:VDU5
  310S1%=600:S3%=200:H1%=200:H2%=500
  311FOR Pick=1 TO 3
  312IFPick=1THEN X%=640:Y%=20ELSE
IFPick=2THEN X%=300:Y%=-188ELSE IF
Pick=3THEN X%=980:Y%=-180
  320RESTORE2000:FORZ=1TO4:FORX=1TO
Z:READH1%,H2%,S1%,S3%:NEXT
  410S2%=S1%/10*4:S4%=S3%/10*4
  510RESTORE1110
  610FOR A=0 TO 2*PI STEP PI/7
  710MOVECOS(A)*S3%+X%,SIN(A)*S4%+
H1%+Y%:MOVECOS(A+(PI/7))*S3%+X%,
SIN(A+(PI/7))*S4%+H1%+Y%
  810READ C:GCOL0,C:PLOT85,COS(A)*
S1%+X%,SIN(A)*S2%+H1%+H2%+Y%:PLOT85,
COS(A+(PI/7))*S1%+X%,SIN(A+(PI/7))*
S2%+H1%+H2%+Y%
  910NEXT:NEXT:NEXT
 1010END
 1110 DATA7,3,6,5,2,1,4,7,3,6,5,2,1,4
 2000DATA280,50,30,200
 2010DATA330,200,30,30
 2020DATA530,110,200,30
 2030DATA640,200,300,200
>
```

Goblets
by T Gregson

Clay Pigeon Shoot

on Lynx

An addictive game for the Lynx. A clay pigeon flies across the screen and you shoot it using the space bar. The computer will sound a bleep if you hit it.

The skill levels determine how fast the pigeon flies. You have 20 shots and at the end are awarded your score.

```
100 REM *** CLAY PIGEON SHOOT ***
110 REM *** JOANNA GREENWOOD  ***
120 LET J=0
130 LET T=0
140 LET F=125
150 PAPER 0
160 INK 7
170 CLS
180 INPUT "SKILL LEVEL (1 TO 8)";E
190 IF E>8 THEN GOTO 180
200 LET A=5
210 LET B=6
220 CLS
230 PLOT 4,F,240
240 PLOT 0,F-1,241
250 PLOT 2,F+1,241
260 IF A>250 THEN GOTO 200
270 PLOT 4,B,5
280 PLOT 4,A,6
290 PLOT 4,B,6
300 PLOT 4,A,5
310 IF KEY$=" " THEN GOTO 400
320 IF INK=0 THEN GOTO 350
330 INK 0
340 GOTO 230
350 LET A=A+E
360 LET B=B+E
370 IF KEY$=" " THEN GOTO 400
380 INK 7
390 GOTO 230
400 INK 7
410 LET J=J+1
420 PLOT 0,F,240
430 PLOT 2,F,5
440 IF INK=0 THEN GOTO 400
450 INK 0
460 GOTO 420
470 IF A=F THEN GOTO 500
480 IF B=F THEN GOTO 500
490 ELSE GOTO 600
500 LET T=T+1
510 BEEP 50,100,63
520 INK 7
530 PLOT 4,F-3,2
540 PLOT 4,F+3,2
550 PLOT 4,F-3,8
560 PLOT 4,F+3,8
570 PAUSE 2500
580 CLS
590 GOTO 630
600 IF J>19 THEN GOTO 670
610 INK 7
620 GOTO 270
630 INK 7
640 LET A=5
650 LET B=6
660 GOTO 230
670 CLS
680 INK 7
690 PAUSE 5000
700 VDU 24
710 IF T<>1 THEN LET D$="S"
720 ELSE LET D$=" "
730 PRINT "YOU SCORED ";J;' POINT";D$
740 PRINT "USING 20 SHOTS"
750 VDU 25
760 PRINT  @ 3,70;"WOULD YOU LIKE ANOTHER GO (Y/N)"
770 IF GET$="Y" THEN GOTO 120
780 END
```

Clay Pigeon Shoot
by Joanna Greenwood

Format

on Dragon

Dragon and other micro users will find this set of routines to be a time saver. They allow a programmer to define sentences and have them printed on the screen without having to count up sentence length to avoid 'wrap-around'. The routines are particularly useful for displaying game instructions, pages of information etc.

Lines 10-60 show how sentences are defined while lines 1000-1050 and 1060-1090 are the routines which handle the screen formatting.

The subroutine at 1000 adds a space to the sentence or phrase since a space is used as a cue to print a word. Missing this out will mean that the last word of a sentence is not printed.

L$ is used to hold each character of the sentence in turn. If L$ is a space *Chr$*(32), the subroutine at 1060 is called before the next group of characters is processed. W$ is used to hold each group of characters.

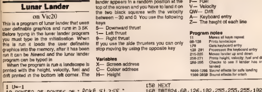
The subroutine at 1060 calculates whether or not a word will fit on to the current print line. *Pos* (1) returns the current horizontal print position — note that the routine could be adapted for use with a printer by using *Pos* (−2). If a word will not fit on to the print lines, a line feed (*Chr$*(13)) is printed before the word is displayed.

Removing the *Rem* statement in line 1080 will cause each new sentence to be printed on a new line.

```
10 NC = 32: REM SCREEN WIDTH (NUMBER OF
   COLUMNS)
20 CLS
30 A$ = "THIS IS THE FIRST SENTENCE WHICH
   IS TOO LONG TO FIT ONTO A SINGLE LINE.
   ":GOSUB1000
40 A$ = "THIS IS THE SECOND SENTENCE,
   WHICH IS ALSO TOO LONG TO BE DISPLAYED
   ON ONE LINE.": GOSUB 1000
50 REM REST OF PROGRAM
60 END
```

```
1000 L$ = "": W$ = "": A$ = A$ + CHR$(32)
1010 PRINT STRING$(3,32),
1020 FOR I = 1 TO LEN(A$)
1030 L$ = MID$(A$,I,1): W$ = W$ + L$
1040 IF L$ = CHR$ (32) THEN GOSUB 1060
1050 NEXT: RETURN
1060 IF POS(Ø) + LEN (W$)> NC THEN PRINT CHR$(13),
1070 PRINT W$;
1080 REM IF MID$(W$,LEN(W$)-1,1) = "." THEN PRINT CHR$(13);
1090 W$ = "": RETURN
```

Format
by B Skinner



Lunar Lander

on Vic20

This is a program of lunar lander that uses user definable graphics and runs in 3.5K. Before typing in the lunar lander program you must type in the initialisation. When this is run it loads the user definable graphics into the memory, after it has been run it can be *Newed* and the lunar lander program can be typed in.

When the program is run a landscape is printed with the height, velocity, fuel and drift printed in the bottom left corner. The lander appears in a random position at the top of the screen and you have to land it on the two black squares with the velocity between −30 and 0. You use the following keys

5— Downward thrust
1— Left thrust
9— Right thrust

If you use the side thrusters you can only stop moving by using the opposite key

Variables

X— Screen address
C— Colour address
H— Height
F— Fuel
V— Velocity
QW— Drift
A— Keyboard entry
Z— The height of each line

Program notes

11	Makes all keys repeat
60-120	Prints landscape
170	Gets keyboard entry
120 201	Processes the keyboard entry
215-225	Moves lander up and down
250-271	Prints height, velocity, fuel and drift
280-295	Checks to see if lander has crashed or landed
1000-1290	Sound effects for safe landing
1500-2050	Sound effects for crash

```
1 U=-1
10 POKE52,25 POKE56,25 : POKE 51,255 :
   POKE 55,255 : CLR
30 READA
40 IFA=-1THENGOTO130
50 FORI=0TO7
60 POKE6144+(8*A)+I,PEEK(32760+(0*A)+1)
70 NEXT
00 GOTO30
100 DATA134,176,177,178,179,100,101,182,
    183,184,185
110 DATA149,133,140,136,137,135,140,150
    143,131,32,96,173
120 DATA160,110,117,1,12,21,14,4,5,18,42,
    25,15,6,11,19,16
125 DATA132,146,174,189,-1
130 FORT=6144TO6151
135 READD
140 POKET,D
150 NEXT
160 DATA24,60,126,102,255,255,255,102
170 FORP=6400TO6408
180 READF
190 POKEP,F
200 NEXT
210 DATA0,0,0,0,0,0,0,0
230 FORT=6145+(8*186)TO6144+(8*186)+40
240 READQ IFQ=-1THEN1000
250 POKET,Q
260 NEXTT
270 DATA3,7,31,127,127,127,255,255
275 DATA7,15,31,31,31,63,255,255
276 DATA224,240,252,248,240,252,255,255
280 DATA255,255,129,255,129,255,255,255
300 DATA128,160,240,240,252,254,254,255,
    -1
1000 POKE36869,254
```

Initialisation

```
1 REM****************
2 REM* LUNAR LANDER*
3 REM* BY BJ DAVISON*
4 REM*   11/10/82   *
5 REM****************
10 C=X+30720
11 POKE650,255
12 POKE36869,254
13 PRINT"J"
14 X=7680+22
15 G=0 H=10000 F=1500 V=-50
16 X=X+INT(RND(1)*21)
17 QW=0
18 H2=10000
20 POKE36878,5
30 POKE36877,190
55 POKE36879,56
60 PRINT"
65 PRINT"
70 PRINT"
75 PRINT"
05 PRINT"
07 PRINT"
90 PRINT"
93 PRINT"
95 PRINT"
97 PRINT"
90 PRINT"
100 PRINT"
110 FORT=8142TO8142+43 POKET,160 POKET
    +30720,2
120 NEXTT
125 PRINT"*****LUNAR LANDER*****"
150 IFH>0THENV=1.05*V
160 H=H+V
163 IFH=10ORH<0THENH=0
170 A=0 GETA
180 IFA=1ANDF>0THENF=F-15 QW=QW+1 POKE
    36877,250
190 IFA=9ANDF>0THENF=F-15 QW=QW-1 POKE
    36877,250
200 IFA=5THENF=F-30 IFF>0THENV=V+25 IF
    F>07THENPOKE36878,15
201 IFA=0THENPOKE36877,190 IFF>0THENPOKE
    36876,5
204 POKEINT(X),32 POKEC,1
205 X=X+(QW/5)
215 Z=H2-H
220 IFZ>=575THENH2=H2-575 X=X+22
225 IFZ<=-550THENH2=H2-550 X=X-22
227 IFX<7680+22ANDH>0THENX=X+22
230 C=INT(X+30720)
235 POKEC,0 POKEX,0
246 FORDE=1TO500 NEXT
248 IFF<=0THENF=0
250 PRINT"FUEL=",INT
    (F)," "
260 PRINT"HEIGHT=",
    INT(H)," "
270 PRINT"VELOC=",
    INT(V)," "
271 PRINT"DRIFT=",
    QW," "
275 IFF<=0THENF=0 POKE36878,0
280 IFPEEK(X+22)=160ANDH=0ANDV>-30ANDV<0
    THENGOTO900
290 IFPEEK(X+22)=186ORPEEK(X+22)=187OR
    PEEK(X+22)=188THENGOTO1500
```

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SOFTWARE FOR DRAGON 32

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CHARACTER GENERATOR by John Line. A program for the programmer [illegible] and saving of character sets/shape tables and subsequent inclusion into users basic program. Demonstration program and full ASCII character set included. Price: (DRAGON) £9.95

GEM PACK IV by W. E. MacGowan. Two great machine code games [illegible] graphics. In [illegible] you must land your plane on the aircraft carrier after dispersing the clouds [illegible]. In Sub Chase you must depth charge the [illegible] without being sunk. Both [illegible] four levels of play [illegible]. Price: (LYNX and DRAGON) £7.95

ALIEN BLITZ by Peter [illegible]. Your craft is running low of fuel and you must land! You have to use your bombs to clear a space amongst the skyscrapers, but beware of aliens! A superb eight-level action game for the Dragon with superb sound and graphics. Price: £7.95

FUNMAYDE 4 by Peter Chase. Improve your maths while you play these four great games! In [illegible] you must [illegible] or a friend to exactly 105 by adding the numbers. **Maths Maze** [illegible] questions as you make your way around the maze. **Chemist** is a game of [illegible] where you mix two chemicals trying not to get blown up! **Dragon** exercises your skill at [illegible] co-ordinates — you have to find the Dragon hidden in a grid. Last but by no means least **Simon** tests your memory for tunes/colours/numbers. Price: (DRAGON) £9.95

LYNX COMPUTING by Ian Sinclair. Excellent book takes the beginner will find an invaluable aid in helping to unravel the LYNX'S many varied controls! Price: £6.95

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[illegible]

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[illegible]

```
291 IFPEEK(X+22)=190THEN1500
295 IFFEEK(X+22)=160ANDH=0ANDV<-30THEN
    GUTO1500
300 GOTO150
900 POKE36677,0
1000 POKE36878,15 PFINT"***YOU LANDED
     SAFELY**"
1010 FORL=1TO10
1020 FORM=180TO235STEP2
1030 POKE36876,M
1040 FORN=1TO10
1050 NEXTN NEXTM
1060 FOKE36876,0
1070 FORM=1TO100 NEXTM
1080 NEXTL
1090 POKE36878,0
1200 GOTO2500
1500 POKE36877,0 POKE36878,15
1510 FORU=250TO128STEP-1
1520 POKE36076,U
1530 NEXTU
1540 POKE36876 0
2000 POKEX,86 POKEC ,Ø
2009 POKE36877,220
2010 FORL=15TO0STEP-1
2020 POKE36878,L
2030 FORM=1TO100 NEXTM
2040 NEXTL
2050 POKE36877 0 POKE36878,0
2500 PRINT"*******FRESS A KEY*****"
2505 POKE196,0
2510 GETT$ IFT$=""THEN2510
2520 RUN
READY.
```

Lunar Lander
by B J Davison

Mamory Map

on Spectrum

This program uses the Spectrum's memory mapped screen and colour memory map. It first fills the screen with a random pattern effect in hi-resolution. Then it pokes random colours into each screen location. When this happens a strange effect appears, certain squares flash between one pattern and another giving a strange but pleasing effect.

```
 5 REM screen memory map
10 LET a=16384
20 POKE a,INT (RND*255)
30 LET a=a+1
40 IF a=22560 THEN GO TO 60
50 GO TO 20
60 POKE a,INT (RND*255)
70 LET a=a+1
80 IF a=22560+768 THEN STOP
90 GO TO 60
```

Memory Map
by Daniel Lucas

Adventure code

(see page 35)

```
15 LET 0$=" )

18 INPUT  ENTER TONE & MESSAGE
          DON T FORGET THE
          $$ 0!"

17 LET CN = LEN (C$) - 7$ INT
          (LEN(C$)/7)

20 IF CN<3 THEN LET CN = CN+8

28 IF CN = LEN (C$) THEN LET
          CN = CN-1

30 FOR N = 1 TO LEN (C$)

35 LET X = 0

40 FOR I = 1 TO CN

45 FOR J = I TO LEN (C$) STEP C

50 LET X = X+1

60 IF J  = N THEN LET 0$ = 0$
          +C$( C$ X I)
            ( THEN LET 0$ =
               0$ + C$(X) )

50 NEXT J

60 NEXT I

70 NEXT N

80 PRINT 0$
```

The $$ that I refer to all stand in for spaces, so there should be no confusion

Cruising & Blind Alley

£10 to be won

Can you beat the new high score?

Cruising

First there was *Space Invaders* then there was *Pacman* – now there is *Cruising*. This all action machine code arcade type game will test your powers of co ordination to the limit. Never before has a game asked you to think so quickly or move so fast.

Achieving a high score on *Cruising* takes considerable skill and not a little patience.

Popular Computing Weekly is offering £10 each month to the player with the highest score on *Cruising*. All you have to do to enter this month's competition is send a print out of your highest score together with your name and address to:

Popular Computing Weekly
Cruising
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

Each month we will publish the name of the winner and the new *Cruising* high score. Are you good enough to accept the *Cruising* challenge?

The winner of last month's competition with a score of 8411 was I C Willis of Shore Lane Sheffield, who receives £10. Entries for this month's competition close on May 31.

Notes

1) Each entry must consist of a ZX printout and your name and address
2) Closing date for this month's *Cruising* challenge entries is April 30
3) The highest score each month will receive £10
4) High scores cannot be transferred from one month to another
5) The judges decision is final
6) No employees of Sunshine Publications Ltd or their families will be eligible to enter

Blind Alley

Blind Alley is a game of strategy. In order to win you must outwit the computer, using your craft to fence in and finally destroy the enemy pursuit vehicles. But watch out for the solid trail left by your opponents — one touch is fatal!

Each month *Popular Computing Weekly* is giving away £10 to the player with the highest score on *Blind Alley*. To enter this month's competition simply send in a copy of your score and the code at the bottom of the score table together with your name and address to:

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19 Whitcomb Street
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The highest score sent in so far is 15480 from Stephen Melakos of Purley, Surrey. Entries for this month's competition close on May 31.



Problems, problems

I am very pleased with the respones to the column — adventure in all its forms is obviously a major pastime for the computing world

Incidentally, one or two of you have mentioned that a full page would be a good idea I agree! If I just keep on writing maybe good old Ed wont notice

One of the adventures that seems to pose insurmountable problems to many of you is *Madness and the Minotaur* I contacted Dragon Data about the problem that seems to be foxing most of you and they promised to send a help sheet to me Unfortunately I have not received it yet so I'm afraid that the mushroom will have to remain elusive!

I can only suggest that you contact Dragon Data and see if you have more luck

If I hear from Dragon Data about the mysterious mushroom, I'll pass the information on to you

Mr Weaver, of Clackmannanshire has a Dragon (the small kind that sits on a table that is!), and has had trouble with a program originally available for the Tandy range The adventure is *Raaka-Tu* and he is stuck at the gargoyle He wonders if there could be a problem with the Dragon-Tandy conversion Well this is a distinct possibility and one that should be borne in mind when buying If any TRS-er can help Mr Weaver, please let me know

Before looking at some more problems, I think a little program would come in handy I've devised with the welcome help of David (*Working Spectrum/Dragon/Commodore 64*) Lawrence a small decoding routine (see page 33) Enter this now — the Basic is pretty standard, except for a line that Sinclair owners will need to replace with [stuff in square brackets like this] Then when I need to pass on your clues to people in a jam I can give them a coded message — if you don't want to see the clue just skip over it (if you're very good at anagrams hard luck clever clogs!)

My apologies to J Hughes from Dyfed who sent me a very good program to decode his own encoded clue for the mainframe adventure that I was writing about a couple of weeks ago I'll return to the mainframe next week.

Now, Tresco Richards, if you remember was stuck in *Adventureland* a Vic20 program He was having trouble with a bear on his way to the treasure Luke Oatham and James Saywell have both sent in the same clue James, in fact, says that the bear problem is the most illogical part of the whole game, so there may well be others of you who have the same problem If you wish to know the answer Run our little decoding program and type this in ("s and all don't forget!)

n "erahllvohy" re "lelo "e " t rdnoe"lenl"

That should do the trick!

> The series of articles is designed for novice and experienced Adventurers alike Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter So if you have an Adventure you want reviewed or if you are stuck in an Adventure and cannot progress any further write to Tony Bridge Adventure Corner, *Popular Computing Weekly* Hobhouse Court 19 Whitcomb Street London WC2 7HF

Adventure Competition

Write an adventure game and win a Commodore 64!

***Popular Computing Weekly* is offering a star prize of a Commodore 64 for the best adventure game written for *any* home micro — PLUS — a special prize of a Vic20 for the best essay on an adventure theme — PLUS — for the next 10 runners-up, two Commodore adventure games of their choice**

Each week during May, *Popular Computing Weekly* will publish a coupon — simply cut out any three and send them in with your entry.

The best adventure games are ideally a combination of action and logical riddles For instance to open a door the player should not merely have to find the magic word but have to solve a puzzle in order to progress to the next location Good graphics obviously enhance a program — and we'll be looking for a game that makes imaginative use of graphics although that does not mean that a text-only program will be eliminated

Other things we will be looking for are the surprise twists that make a program worth coming back to again and again

And remember don't make your game too difficult in the early stages — adventuring novices should have a chance to get some way into the game before getting stuck!

For those of you submitting scenarios with your program think of it as a guide line for a programmer Draw a map showing location objects and other important details of your adventure and compile a dictionary of key words that your program will accept

If you do not want to write a full-blown adventure game you can still enter the competition by writing an essay (up to 2,000 words) on an original adventure theme A Vic20 will be awarded to the essay which describes the most original and interesting adventure game

The competition will be judged by Tony Bridge and Popular Computing Weekly editor Brendon Gore

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All you have to do to enter this competition is collect the coupons from three issues of the magazine and send them together with your entry (stating which machine your game is for) and your name and address to

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RULES

1 Each entry must consist of your adventure or essay together with three coupons and your name and address
2 Closing date for the Adventure Competition is 30 June 1983
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TANDT PROBLEMS

M V Buswell of Stevens Road Stourbridge, West Midlands writes

Q My son has a Tandy TRS-80, Basic Colour Computer (16K), which after a short while he now finds very limiting. He is hoping to make computing his career, and wanting to give him every encouragement we are willing to extend the computer to give him extra facilities. The real drawback is the apparent lack of any literature, books, etc for the computer.

Since last December we have bought various Micro magazines and on only one occasion have we found a program for the TRS-80, and that was for a black and white model which would not *Run* on the Colour Computer. It is very noticeable how magazines always contain programs for the ZX, Dragon, BBC and Commodore machines, but never Tandy.

As an alternative we have considered selling our Tandy and buying something else. My son has suggested a Spectrum, as it will give him all the facilities of an extended Colour Computer, plus extensive back-up when it comes to software, books and so forth. However, as I understand that the Spectrum does not have a conventional keyboard but uses Basic and Sinclair Basic, I wonder whether or not this would be a disadvantage later. I am writing to you as I know very little about computers.

A This is an important letter as it reflects what I think will be a growing difficulty in the computer world. Namely, people buying in good faith a computer that for whatever reason is not well supported. I dealt with a similar situation as regards the TI 99/4a last year.

What knocked the ground from underneath the TRS-80 Colour Computer was the Dragon. Dragon Data produced a similar machine that had more facilities, at a cheaper price. In fact TRS-80 Colour Computer owners are not as badly off as some others, because some Dragon programs may be *Run* exactly as printed on them.

The main difficulties arise when it comes to cassette operation, but an answer has now been found. Since receiving your letter we have run a story on the Compusense Cartridge that will enable you to *Load* on to the Colour Computer any Dragon program on cassette (*Popular Computing Weekly*, March 24-30).

The Dragon is by far the most important newcomer to the home computer market, and I think by the end of this year it will be up at the top along with Sinclair, Acorn and Commodore. There would be no sense in buying another computer if you had access to all the software that is, and will become, available for the Dragon this year. A glance through the small ads in *Popular Computing Weekly* in the same week we announced the Compusense Cartridge will reveal four Dragon/TRS-80 advertisements, including a tape version of the Compusense Cartridge. There is also a TRS-80 users club which can be contacted at 40a High Street, Stony Stratford, Milton Keynes.

Your confusion over *Basic* is understandable. It must be kept in mind that *Basic* is a common core of commands. With the rapid advance of chip design this core has been enhanced, each company advancing as it sees fit, leading to several dialects of *Basic*. The TRS-80 uses a form of Microsoft *Basic* which is probably the most common in the world, though Sinclair *Basic* is probably the most common in this country. It is just that it is easy to refer to an individual dialect by calling it 'Sinclair *Basic*', 'Microsoft *Basic*' and so forth.

I have had a couple of similar queries since Christmas, from TI 99/4a owners, so I shall repeat the address of the users club: TIHome, Paul Dicks, 157 Bishopsford Road, Morden, Surrey.

CURRENT POWER?

Donald Mclean of Old Evanton Road, Rosshire, Scotland, writes

Q Why is my printer working with a power source that is insufficient? According to the manual the power source should be 9V/1.2 amps. The one currently (excuse the pun) in use is only 9V/0.5 amps. I am using the power supply supplied with the computer, but between that and the computer is a set of rechargeable batteries that give the lower power.

A Your printer is not working on a power source that is insufficient. It is drawing its power from the mains not the recharger. The fact that the recharger is 'in the way' does not, I'm afraid, make that much difference. The current from the mains does not magically stop at the recharger, because the line from the recharger to the computer gives it somewhere else to go.

You can test this by setting up the equipment as you describe, and then turning off at the mains: the system should then crash. The batteries might support a 1K ZX81 without any attachments, but not with a printer. Again try it, but in both cases try it only once out of interest. It will not do your system any good to try and draw more current from the power supply than is available.

LIGHT PEN

A R Adamson of Slab Lane, West Wellow, Romsey, Hants writes

Q Could you please give me more details of the light pen mentioned in the exhibition reviews in 'Street Life' in the issue of 1 January 1983.

The article mentioned Microdeal, perhaps you could give me their address. Would the light pen read bar-coded programs, and are there any available? Does the light pen require special software for it to be used?

A The light pen comes with three software programs: a simple demonstration program that occupies 2K, a quiz that occupies 4K, and a music composer that occupies 10K. By the time you read this there should also be a backgammon that uses the whole 32K.

You will not be able to read bar-codes because, like most of the light pens on the market, it only has a receiver, and no emitter. It needs something which produces light, like a television.

However, a bar-code does not emit light, and as the pen does not shine any light on to it nothing is reflected back that it can read. This should not be any real problem, as I know of no bar-code programs for any of the British home micros, and I would not expect there to be much demand for them in the future.

Microdeal have recently moved and are now at 41 Truro Road, St Austell, Cornwall PL25 5JE.

IMPROVED GRAPHICS

David Walker of Driftwood, Southsea Hants writes

Q I am thinking of getting an Acorn Electron, and I wondered whether I could use the BBC Buggy on it. Also whether or not the Hi-Res graphics could be improved.

A Any answer to this won't be definite until later in May, as the Electron is not expected to make its first appearance just yet.

What you need is an 8-bit port, the lack of this is the reason the buggy will not work on the BBC A. Acorn are still keeping details of the Electron close to their chest, but I would doubt that it would have the necessary port on it.

As for your second point I am not sure what you mean. But I wouldn't expect the Electron to have the various display modes of the BBC.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

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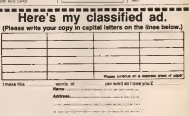
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SHARP PC 1200 pocket computer £140 ono Tel Oxford 58152 anytime

SWAP PLANET INVASION by Microdeal for Caterpillar Attack or Scarfman by Microdeal Tel 571 3810

DK TRONICS ROM + UDG Chip + two tapes 1 demo 1 Asteroids £20 one Tel 368 0630 (after 5 pm)

SPECTRUMS MAGAZINES worth £80 + £30 of software + two books altogether worth £110 accept £30 ono Tel 368 0630 after 6 pm

VIC20 MISSION IMPOSSIBLE ADVENTURE CARTRIDGE swap for Pirate Cove or Adventure Land Tel 0443 892120 after 5 pm

COMMODORE 64 SOFTWARE, Lame cat Attack of the Mutant Camels original cassette £6 Abacus software games pack also original boxed cassette £6 Tel 01-658 0611 after 6 pm

DRAGON 32 + joysticks, tape recorder two cartridges + software leads, manuals £195 Tel Chelmsford 50092

PRINTER TERMINET KSR 300 with RS232 interface 30 CPS 80 column Tractor Drive suit most micros with RS232 £50 Tel 041 838 5441 weekends only

SHARP PC1211 + printer and manuals, £90 ono Tel. 0606 879101 ext 371 office hours

ZX81 software + books for sale half price Tel Norwich 663480

FIVE ROOLS OF SINCLAIR ZX PRINTER PAPER, £8 Tel 01 364 4540

Wanted

WANTED ZX printer any condition with box Tel 573-6442 (after 3.40 pm)

WANTED, Commodore 8K £15 Tel 01-579 2129

BBC B for £200 or in exchange with a C8 + cash Call Crowthorne 4154

THERMAL printer for TI99 4a Tel 0872 52548

WANTED Sharp MZ 80K for about £200 Tel Ilford 5545677 (after 5 pm)

ANY ONE WHO HAS SOLVED the Commodore Count cartridge please give advice to A. Kerr Burnbank, Canal Avenue Johnstone PA5 8ET Reward given.

WANTED Sharp MZ80B cash waiting good price paid. Tel Watford 46855 (5 pm)

TI99 4A Thermal printer Tel 0872 52548

WANTED Carry case for Vic20 approximately £8 Tel Tilbury 77529 (6 pm)

SBC MICRO MODEL B Milton Keynes area Tel 0908 585388

ZX80 or 81 WANTED Tel Southend (0702) 335918

WANTED Commodore 64 Programmers Reference Manual Tel 748 8179

WANTED BASIC ZX81 Tel 0538 755235 (Cheadle Staffs)

CASIO FX502P programmable portable calculator with cassette interfaces manuals etc Total original cost £100 will accept £50 Tel 01 531 2692 evenings and weekends

...YNX £100-£200 Must be still under guarantee Tel 04582 70318

WANTED ZX PRINTER about £25. Tel 0606 879101 ext 371

MORSE CODE + RTTY decoding programs for Atari 400 Burghfield 3373

CBM OR PET MAIN CIRCUIT BOARD, up to £100 offered would consider buying complete machine not necessarily working Tel Chester (0244) 675717

ZX SPECTRUM 16K, lowest sales region Tel Thetford 61262.

BBC MODEL B with or without software Tel Chester 336050

DRAGON OWNER wishes to swap Goat Attack cartridge for Berserk cartridge or any other programs Tel Upminster 25815

WANTED VIC20 16K, expansion, Ram cartridge Tel Peterborough 208135

WANTED BBC Model B up to £275 Tel 0632 384858 Sandra

ORIC 1 computer urgently wanted Tel Harpenden 59162 with details evenings

WANTED Spectrum 48K, all leads tapes and manuals, will pay £90 in N London area Tel 01-445 1327 Sundays or between 8 pm and 10 pm

WANTED Golf Vic20 cartridge Tel Johnstone Renfrewshire 21366

OTHELLO for Vic20 will swap for Cosmic Battle Tel Banbury 720640 ask for Adrian

WANTED ZX80 Tel New Mills 43874 Ian Lockhart.

FOR VIC20 16K serial printer Tel Waltham Cross 23881 after 4 pm

SPEAK EASY by Quicksilver desperately wanted to buy or swap Tel 0972 863201 Tuesday or Thursday evening

WANTED Dragon owner to swap leads + information will buy sale Berserk Rom £10 ono Contact Greg Tel Pelsall (0922) 682643 after 5 pm.

INTELLIVISION owners willing to swap or sell cartridges Tel 0948 561340

SPECTRUM Mwrld Pimania cassette Will buy or swap with other software Tel 858 0253 after 5 pm

WANTED 48K Spectrum, Must be in A1 condition around £140 Tel Maidstone 861664

16K RAM PACK for Vic20 after £30 Tel Worthing 202074

WANTED 48K Spectrum with software etc good condition Tel Pontefract 0977 707983

HITACHI stereo music centre or Praktica SLR camera MTL3 (both mint) + cash if necessary for will BBC/Spectrum/WHY Tel 01-858 3808

NEW RELEASES

SPACE ATTACK



John Edwards, Astro Blaster author

Astro Blaster seems to be in the classic space game tradition This game from Quicksilva features aliens, meteor storms plasma bolts and rapid fire laser

The game boasts five attack waves and 15 levels of difficulty It also features a demo version and a joystick option

Program *Astro Blaster*
Price *£4 95*
Micro *Spectrum 16/48K*
Supplier *Quicksilva*
Palmerston Park House
13 Palmerston Road
Southampton SO1 1LL

BAD LOSER

Renaissance is one of the first games for the Commodore 64 It is a version of the popular game *Othello* where you can play against the computer

Other features include the opportunity to take back moves you regret and to seek help from the computer Although you are warned that this advice will be somewhat circumspect since the computer doesn't like to lose

Program *Renaissance*
Price *£8 95*
Micro *Commodore 64*
Supplier *Audiogenic Ltd*
PO Box 88 Reading
Berks

RUBBISH TIP

Following a success like *Arcadia* must be a nerve-wracking experience *Schizoids* by Imagine is just that

You are a sort of intergalactic garbage man, whose job it is to push debris into a black hole Although equipped with a powerful space dozer this is not so easy, since if you get too close you will also be dragged in

Extra lives can be won by clearing particular bits of debris

Program *Schizoids*
Price *£5 95*
Micro *Spectrum 16/48K*
Supplier *Imagine Software*
Masons Building
Exchange St East
Liverpool L2 3PN



DESIGNER

Wintersoft has issued a number of new cassettes for the Dragon 32 *Artist s Designer* is a utility program that allows you to create designs using the hi-res of the Dragon and allows you to then save your design on tape

Cursor keys move the "pen" around the screen and a number of options like *box* and *fill-in* are available

Program *Artist s Designer*
Price *£6 99*
Micro *Dragon 32*
Supplier *Wintersoft*
101 Westminster Bridge Road
London SE1 7HR

MAGIC WAND

The Wizard from Quicksilva seems to transplant the themes of adventure into an arcade-style game

As the Wizard it is your task to fight off the evil hoards To do this you are equipped with a wand which you can rotate left and right

The game features high resolution graphics and much of the BBC's sound option to enhance the other-world scenario Could it be the beginning of a new trend — *Dungeons and Puckmen* – *Wizard Invaders?*

Program *The Wizard*
Price *£6 95*
Micro *BBC Model B*
Supplier *Quicksilva*
Palmerston Park House
13 Palmerston Road
Southampton SO1 1LL

CHECK-MATE

The first version of chess I have seen for the Commodore 64 is *Grand Master* from Audiogenic

Claimed to be the strongest chess program the game also features facilities like hint function and the chance to take back moves

An interesting feature I have not seen before in a chess program is the chance to cut short the computer s thought processes, which on higher levels can take a very long time, and force it to move at once

The game is expensively packaged with a booklet containing, amongst other things a history of the game It comes at a luxury price — £17.95

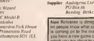
Program *Grand Master*
Price *£17 95*
Micro *Commodore 64*
Supplier *Audiogenic Ltd*
PO Box 88
Reading Berks

DRUNK IN CHARGE

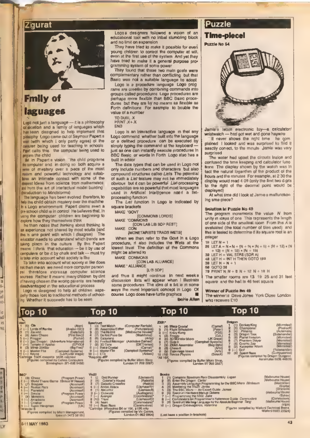
Motor Mania is described as a "thrilling cross country car rally" in which you use a large number of controls to try and avoid the drunken drivers who cross your path

Other hazards include potholes, road patches and broken glass A high score is simply a matter of how long you last

Program *Motor Mania*
Price *£8 95*
Micro *Commodore 64*
Supplier *Audiogenic Ltd*
PO Box 88
Reading Berks



New Releases is designed to let people know what software is coming on to the market If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases Popular Computing Weekly 19 Whitcomb Street London WC2 7HF



Zigurat

Fmily of laguages

Logo is not just a language — it is a philosophy of education and a family of languages which has been designed to help implement that philosophy. Logo came out of Seymour Papert's view (with which I only partly agree) of the computer being used for teaching in schools. Papert calls this the computer being used to program the child.

But in Papert's vision the child programs the computer and in doing so both acquires a sense of mastery over a piece of the most modern and powerful technology and establishes an intimate contact with some of the deepest ideas from science, from mathematics and from the art of intellectual model building (Introduction to *Mindstorms*).

The language has been evolved, therefore, to help the child obtain mastery over the machine. In a Logo environment Papert claims even a pre-school child is in control. He believes that in using the computer children are beginning to explore how they themselves think.

He then notes that thinking about thinking is an experience not shared by most adults (and this is one point with which I disagree). The educator needs to understand which trends are taking place in the culture. By this Papert means I think that education — be it by use of computers or be it by chalk and talk — must try to take into account what society is like.

To take into account what society is like does not then mean we need more computer personnel therefore increase computer science courses. Rather it means many children by dint of having chosen the wrong parents are heavily disadvantaged in the educational process.

Logo is designed to help all children especially those lost to traditional methods of schooling. Whether it succeeds has to be seen.

Logo's designers followed a vision of an educational tool with no initial stumbling block and no limit on expansion.

They have tried to make it possible for even young children to control the computer at will, even at the first use of the system. And yet they have tried to make it a general purpose programming system of some power.

They found that these two main goals were complementary rather than conflicting but that Basic was not a suitable language to adopt.

Logo is a procedure language. Logo programs are created by combining commands into groups called procedures. Logo procedures are perhaps more flexible than BBC Basic procedures but they are by no means as flexible as Forth definitions. For example to double the value of a number

```
TO DUBL :X
PRINT :X+:X
END
```

Logo is an interactive language in that any Logo command whether built into the language or a defined procedure can be executed by simply typing the command at the keyboard — just as one can instantly execute procedures in BBC Basic or words in Forth. Logo also has a built in editor.

The data types that can be used in Logo not only include numbers and characters but also compound structures called *Lists*. The potential of such a *List* feature may not be immediately obvious but it can be powerful. *List*-processing capabilities are so powerful that most languages used in Artificial Intelligence need a list-processing function.

The *List* function in Logo is indicated by square brackets

```
MAKE "GOVT
          [COMMONS LORDS]
MAKE "COMMONS
        [CON LAB LIB SDP REST]
MAKE "CON
        [MONETARISTS TRADS WETS]
```

When we then refer to the Govt in a Logo procedure, it also includes the Wets at the lowest level. The definition of the Commons might be altered to

```
MAKE "COMMONS
          [CON LAB ALLIANCE]
MAKE "ALLIANCE
                [LIB SDP]
```

and thus it might continue. In next week's discussion lists will appear when I illustrate some procedures. The idea of a list is in some ways the most important concept in Logo. Of course Logo does have turtle graphics. ■

Leslie Allen

Puzzle

Time-piece!

Puzzle No 54

Jamie's latest electronic toy—a calculator/wristwatch — had got wet and gone haywire.

"It never shows the right time," he complained. I looked and was surprised to find it exactly correct, to the minute. Jamie was very surprised.

The water had upset the circuits inside and confused the time keeping and calculator functions. The display shown by the watch was in fact the natural logarithm of the product of the hours and the minutes. For example, at 2.30 the display would read 4.09 (only the first two digits to the right of the decimal point would be displayed).

At what time did I look at Jamie's malfunctioning time-piece?

Solution to Puzzle No 49

The program increments the value *N* from unity in steps of one. This represents the length of one side of the smallest room. From this *A* is evaluated (the total number of tiles used) and this is tested to determine if its square root is an integer.

```
10 LET N = 1
20 LET A = N*N + (N + 6)*(N + 6) + (N + 12)*(N
   + 12) + (N + 18)*(N + 18)
30 LET H = VAL STR$ (SQR A)
40 LET H = INT H THEN GOTO 100
50 LET N = N + 1
60 GOTO 20
70 PRINT N, N + 6, N + 12, N + 18, H
```

The smaller rooms are 13, 19, 25 and 31 feet square and the hall is 46 feet square.

Winner of Puzzle No 49

The winner is Dave Jones, York Close, London who receives £10.

Top 10

Atari

1	(6)	Qix	(Atari)
2	(—)	Lords of Karma	(Avalon Hill)‡
3	(1)	Zaxxon	(DataSoft)
4	(6)	Astro Chase	(First Star)†
5	(—)	Frogger	(Parker)
6	(—)	Sea Dragon	(Adventure International)
7	(—)	Temple of Apshai	(EPYX)†
8	(3)	Miner 2049er	(Big Five)*
9	(—)	Master File	(Campbell Systems)
10	(—)	Kayos	(Computer Magic)

*Cartridge †32K cassette ‡48K cassette

(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

Spectrum

1	(3)	Test Match	(Computer Rentals)
2	(8)	Assembler/Editor	(Picturesque)
3	(2)	The Hobbit	(Melbourne House)*
4	(7)	Do Not Pass Go	(Workforce)
5	(6)	Galaxians	(Artic)
6	(4)	Football Manager	(Addictive Games)*
7	(9)	3D Tanx	(DK'Tronics)
8	(—)	Black Crystal	(Carnell)*
9	(—)	Master File	(Campbell Systems)*
10	(—)	ETX	(Abbex)

*Requires 48K

(Figures compiled by Buffer Micro Shop, London 01 769 2887)

ZX81*

1	(4)	Black Crystal	(Carnell)
2	(1)	Flight Simulation	(Psion)
3	(—)	Krazy Kong	(PSS)
4	(2)	Froggy	(DJL)
5	(6)	3D Monster Maze	(JK Greye)
6	(7)	Gulp II	(Campbell Systems)
7	(3)	ZXAS Assembler	(Bug-Byte)
8	(8)	Chess II	(Artic)
9	(9)	Espionage Island	(Artic)
10	(10)	Revise Physics	(Select)

*All 16K

(Figures compiled by Buffer Micro Shop, London 01 769 2887)

Dragon

1	(1)	Donkey King	(Microdeal)
2	(5)	Champions!	(Peaksoft)
3	(4)	Pimania	(Automata)
4	(3)	Dragon Trek	(Salamander)
5	(6)	Planet Invasion	(Microdeal)
6	(7)	Phantom Slayer	(Microdeal)
7	(9)	Cosmic Zap	(Microdeal)
8	(2)	Katerpillar Attack	(Microdeal)
9	(—)	Golf	(Salamander)
10	(8)	Space Race	(Compusense)

(Figures compiled by Dragon Dungeon, Ashbourne 0335 44626)

BBC*

1	(6)	Chess	(Program Power)
2	(—)	World Theme Game	(Simon W Hessel)
3	(7)	Snapper	(Acornsoft)
4	(—)	Rocket Raid	(Acornsoft)
5	(—)	Planetoid	(Acornsoft)
6	(—)	Swoop	(Program Power)
7	(4)	Monsters	(Acornsoft)
8	(—)	Arcadians	(Acornsoft)
9	(—)	Croaker	(Program Power)
10	(—)	Super Hangman	(UK)

*All Model B

(Figures compiled by Micro Management, Ipswich 0473 59181)

Vic20

1	(2)	Grid Runner	(Llamasoft)
2	(5)	Colonel's House	(Rabbit)‡
3	(7)	Galactic Crossfire	(Rabbit)
4	(—)	Andes Attack	(Llamasoft)†
5	(1)	Abductor	(Llamasoft)
6	(—)	Outworld	(Audiogenic)
7	(—)	Avenger	(Commodore)*
8	(10)	Traxx	(Llamasoft)†
9	(4)	Ivan	(Commodore)
10	(—)	Rose Race	(Commodore)

*Cartridge †Requires 8K or 16K. ‡16K only

(Figures compiled by Vic Centre, London 01-992 8904)

Books

1	(1)	Complete Spectrum Rom Disassembly *Logan*	(Melbourne House)
2	(8)	Enter the Dragon *Carter*	(Melbourne House)
3	(5)	Assembly Language Programming for the BBC Micro *Birnbaum*	(Macmillan)
4	(6)	Mastering the Vic20 *Jones*	(Sigma)
5	(3)	The BBC Micro — An Expert Guide *James*	(Granada)
6	(4)	Spectrum Hardware Manual *Dickens*	(Melbourne House)
7	(—)	Programming the 6502 *Zaks*	(Sybex)
8	(—)	Commodore 64 Programmer's Reference Guide *Commodore*	(Commodore)
9	(9)	Spectrum Machine Language for the Absolute Beginner *Tang*	(Melbourne House)
10	(—)	Dragon Extravaganza *Valentine*	(VSH)

(Figures compiled by Watford Technical Books, Watford 0923 23324)

(Last week's position in brackets)



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